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PART III

FEDERAL ENERGY ADMINISTRATION

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ENERGY CONSERVATION PROGRAM FOR APPLIANCES

Energy Efficiency Improvement Targets

FEDERAL ENERGY ADMINISTRATION

[10 CFR Part 430]

ENERGY CONSERVATION PROGRAM FOR APPLIANCES

Proposed Rulemaking and Public Hearings Regarding Energy Efficiency Improvement Targets

AGENCY: Federal Energy Administration.

ACTION: Proposed rule.

SUMMARY: The Federal Energy Administration hereby proposes energy efficency improvement targets under the Energy Policy and Conservation Act, as amended by the Energy Conservation and Production Act. This legislation requires that energy efficiency improvement targets be prescribed for certain types of appliances. The intended effect of this proposal is to solicit public comments before the targets are prescribed.

DATES: Comments by August 22, 1977; requests to speak by August 10, 1977; statements by August 12, 1977; hearings to be held from August 16, 1977, to August 19, 1977.

ADDRESSES: Comments, requests to speak at hearings, and statements to:

Federal Energy Administration, Executive Communications, Room 3317, Box NU, 12th and Pennsylvania Ave., NW., Washington, D.C. 20461.

HEARING LOCATION:

Federal Building, Room 3000A, 12th and Pennsylvania Ave., NW., Washington, D.C. 20461.

FOR FURTHER INFORMATION CONTACT:

James A. Smith (Program Office), Room 307, Old Post Office Building, Federal Energy Administration, Washington, D.C. 20461, 202–566–4635.

Robert C. Gillette (Hearing Procedures), 2000 M Street, NW., Room 2222A, Washington, D.C. 20461, 202–254–5201.

Jim Merna (Media Relations), 12th & Pennsylvania Ave., NW., Room 3104, Washington, D.C. 20461, 202–566–9833.

William J. Dennison (Office of General Counsel), 12th & Pennsylvania Ave., NW., Room 7148, Washington, D.C. 20461, 202–566–9750.

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I. Introduction

Part B (42 U.S.C. 6291–6309) of Title III of the Energy Policy and Conservation Act (Act) (Pub. L. 94–163), as amended by section 161 of the Energy Conservation and Production Act (Pub. L. 94–385), requires the implementation of an energy conservation program for consumer products other than automobiles. As part of this program, the Federal Energy Administration (FEA), with the assistance of the National Bureau of Standards (NBS), is required to prescribe energy efficiency improvement targets for covered products, which are types of appliances specified in section 322(a) of the Act. The targets are required to be designed so as to identify the maximum improvement in the energy efficiency of appliances determined by FEA to be technologically and economically feasible by 1980. This notice is intended to replace Subpart C of previously proposed Part 430, Chapter II, Title 10, Code of Federal Regulations (41 FR 19981, May 14, 1976). The targets proposed today are more specific than the targets in the original proposal of Subpart C, which is today withdrawn.

Section 323 of the Act requires FEA to prescribe test procedures for covered products. The test procedures to be prescribed in Subpart B of Part 430 will be used in monitoring the progress of manufacturers toward meeting the energy efficiency improvement targets. These test procedures will also be used by the Federal Trade Commission (FTC) under section 324 of the Act, which requires FTC to prescribe product labeling rules designed to provide consumers with energy information which will assist them in making purchasing decisions concerning appliances.

Under section 325(a)(4) of the Act, FEA will require manufacturers of covered products to submit such reports as FEA determines may be necessary to ascertain whether the energy efficiency improvement target for a type of covered product will be met. If FEA then determines that a particular target is not likely to be met, FEA is required to commence a proceeding to prescribe an energy efficiency standard for the particular type of product or a class thereof.

Section 325 of the Act requires that FEA direct NBS to develop and that FEA by rule prescribe an energy efficiency improvement target for each of the following types of products (including their functional equivalents):

(1) Refrigerators and refrigerator-freezers
(2) Freezers
(3) Dishwashers
(4) Clothes dryers
(5) Water heaters
(6) Room air conditioners
(7) Home heating equipment, not including furnaces
(8) Television sets
(9) Kitchen ranges and ovens
(10) Clothes washers
(11) Humidifiers and dehumidifiers
(12) Central air conditioners
(13) Furnaces

This notice proposes targets for products listed in (1) through (10) above. Targets for products (11) through (13) will be proposed at a later date.

The targets for products listed in (1) through (10) are required to be designed so that, if met, the aggregate energy efficiency of all such products which are manufactured in 1980 will exceed the aggregate energy efficiency of all such products manufactured in 1972 by a percentage which is the maximum percent age improvement which FEA determines is economically and technologically feasible, but which in any case is not less than 20 percent.

The proposed targets were established in three stages. First, potential energy efficiency improvement design options for each product type were identified and then analyzed to determine whether they were technologically feasible. The energy savings of individual design options were combined to provide a single target for each product. In the second stage the economic feasibility of the energy efficiency targets calculated in the first stage was evaluated. In the third stage the individual product type targets were combined to determine the aggregate energy efficiency improvement of these product types manufactured in 1980 as compared with the aggregate energy efficiency of those products types manufactured in 1972.

II. Technical Analysis

A. Methodology for Determining Technological Feasibility

The determination of a technologically feasible energy efficiency improvement target for a product type required a thorough analysis to identify the design characteristics of currently available products which affect their energy efficiency. The Act requires that the aggregate energy efficiency improvement for these products be at least a 20 percent improvement over their 1972 efficiency performance. Accordingly, this analysis used the products produced in 1972 as a baseline. Further, the 1980 targets were required to be the maximum technologically and economically feasible, which necessitated an iterative process whereby various design improvement options and combinations of these options were studied to determine their technological feasibility, effects on improving the efficiency of the product type, and economic feasibility.

The design options referred to in this notice demonstrate the technological and economic feasibility of the 1980 targets but are not intended to dictate future product design. There may be other design options or combinations of design options which can be used by

a given manufacturer to achieve the 1980 energy efficiency targets being proposed today, but no greater efficiency improvement is feasible for any appliance industry as a whole.

FEA and NBS relied on the cooperation of the relevant manufacturing industries to define the 1972 baseline energy efficiency performance of the covered products. The data that were requested of and supplied by the industries included data which described the capacities, energy efficiency performance, and production volume for the covered products. The energy efficiency performance data were reported by the industry using test procedures that had been developed by industry for internal use. Several of the test procedures which were recommended by NBS for use in FEA's appliance efficiency program were quite similar to the industry test procedures, allowing a straight-forward use of the industry-supplied data. For those industry test procedures which measured energy efficiency in a manner different from FEA's test procedures now under consideration, NBS was able to adjust the industry data to reflect energy efficiency as it would be measured by FEA's test procedures.

In addition to the measures of efficiency describing the 1972 product baseline, FEA also received information describing the percentage of 1972 products possessing certain design characteristics which, if included in a higher percentage of the 1980 products, would contribute to an overall improvement in product efficiency. This was done to assure that the industry initiatives in 1972 to improve a product's efficiency were taken into account in the development of 1980 targets.

This accounting process is explained later in this notice when the energy factors are discussed.

The technological feasibility analysis began with the identification of design options that would improve the energy efficiency of a product. Once these design options were identified, they were evaluated by NBS to determine their contribution to improving the energy efficiency of the product, their impact on increased retail cost, and their impact on material usage. In order for the design option to be considered technologically feasible, it had to be an available technology that could be incorporated into production by 1980 without significant hardship. Increased materials necessary for the implementation of the design change had to be readily available, so that incorporation of the design change would not be limited by the lack of materials.

The contribution of each design improvement to the product's efficiency was evaluated by NBS. The increased costs were estimated using industrial engineering techniques or catalogues for those design features which already existed in the marketplace. A simple payback analysis which compared increased retail costs to operating cost savings was used by NBS as a final criterion for selecting a design option for further evaluation. Where the increased cost exceeded the savings, an option was rejected. Of course, a target incorporating these options still had to meet the further economic feasibility test discussed below.

After the technologically feasible individual design options were identified, combinations of design options were evaluated using the proposed or final FEA test procedures (and in appropriate cases, the 1972 baseline data), to determine the maximum technologically feasible energy efficiency improvement for a product type. This was done for product types and where necessary within such types, by power source (e.g., gas, oil, electricity). Energy factors for these products were determined using the proposed or final FEA test procedures as a touchstone.

The combination of design improvement options chosen to demonstrate the technological feasibility of the 1980 targets was then subjected to an economic analysis to determine their economic feasibility. As described in detail below, this economic feasibility analysis relied on NBS estimates of the design improvements' effects on efficiency improvement, increased retail costs, and increased material usage. The efficiency improvement targets within product types were combined by a simple weighted average approach using their estimated 1972 energy consumption.

Table I summarizes the methodology used in calculating a 1980 production-weighted aggregate percent efficiency improvement over 1972 for the 10 products concerned. First, the production-weighted 1972 annual energy consumption of each product type was summed in computation 1. These figures are based on 1972 production and efficiencies for each product type. Then the production-weighted annual energy savings for each product type in 1980 (computed by multiplying the percent of energy savings by the 1972 production-weighted energy consumption) was summed in computation 2. In computation 3, the percent of production-weighted energy savings in 1980 was calculated by dividing the result of computation 2 by the result of computation 1. An aggregate energy efficiency improvement for all 10 products in 1980 was derived in computation 4, which yields a 35 percent improvement over 1972.

The detailed 1980 targets for the product types and classes within a product type are presented below. A list of design options chosen to demonstrate technological feasibility is also included. Energy factors representing average 1972 product efficiency and the 1980 target efficiency are presented. The energy factor for a product can be determined through application of the FEA test procedures.

TABLE 1.—*Percent energy efficiency improvement computation chart*

Product type	Production-weighted 1972 annual energy consumption (10^{12} Btu)	Aggregate production-weighted annual energy savings in 1980 based on 1972 production (x 10^{12} Btu)
1. Refrigerators and refrigerator/freezers	38.95	12.46
2. Freezers	7.68	1.77
3. Dishwashers	18.89	3.78
4. Clothes dryers	15.70	1.50
5. Water heaters	[1] (176.91−48.62)	32.88
6. Room air-conditioners	19.44	4.47
7. Home heating equipment	42.56	3.60
8. Television sets	16.70	7.29
9. Kitchen ranges and ovens	34.72	13.64
10. Clothes washers	34.35	10.99
Aggregate	[2] 357.28	[3] 92.38

[1] Production weighted annual energy consumption for water heaters includes 15.79×10^{12} Btu consumed by dishwashers and 32.83×10^{12} Btu consumed by clothes washers for hot water usage. Therefore, the water heater energy consumption is reduced by 48.62×10^{12} Btu since it is already accounted for in the dishwasher and clothes washer figures.
[2] Computation 1.
[3] Computation 2.

Computation 3: $\frac{\text{Aggregate production weighted annual energy savings (computation 2)}}{\text{production-weighted 1972 annual energy consumption (computation 1)}} = \text{Percent of 1972 production-weighted energy savings}$

Computation 4: $\frac{\text{Percent of 1972 production-weighted energy savings}}{\text{100—pct of 1972 production-weighted energy savings}} = \text{Aggregate percent EEI}$

B. TECHNOLOGICAL ANALYSIS OF EACH PRODUCT

Each of the following proposed product-specific energy efficiency improvement targets is based on the best available information and represents FEA's determination of the maximum efficiency that is technologically feasible, as derived by use of the methodology described above.

Included in each analysis is a description of the design options selected as the means to attain the 1980 targets. Each discussion refers to a table that states the production-weighted energy savings of each design option selected for a particular product, as well as the estimated lead-time required before the option can be incorporated into the product. The design options identified may not encompass all the design options available to a given manufacturer for improving the energy efficiency of a particular product, but they do demonstrate the technological feasibility of the proposed energy efficiency improvement target for a particular product type.

A detailed discussion of the target determination procedure for each product is contained in a separate technical paper prepared by NBS. As provided later in this notice, each paper is available for inspection by interested persons.

Refrigerators and Refrigerator-freezers

The proposed energy efficiency improvement target for refrigerators and refrigerator-freezers is 47 percent. The refrigerator and refrigerator-freezer design options that were selected to demonstrate the technological feasibility of the proposed target are: improving the compressor motor efficiency through the use of permanent split capacitor (PSC) motors, eliminating the condenser fan motor, improving the insulation by using foam insulation instead of fiberglass, improving the door seals and cabinet throat design, and providing an on-off control switch for the antisweat heater, when an antisweat heater is used as a condensation control device. The production-weighted energy savings of each design option described above for refrigerators and refrigerator-freezers, and the estimated lead time required for implementation, are presented in Table 2.

TABLE 2.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for refrigerators and refrigerator-freezers*

Recommended design options	Estimated production-weighted energy savings (percent)	Lead time for implementation (years)
1. Improve compressor motor efficiency.	9	2
2. Eliminate condenser fan motor.	1	2
3. Improve insulation	12	2
4. Improve door seals and cabinet throat design.	4	2
5. Provide on-off switch for anti-sweat heaters.	6	1
Aggregate	32	

1980 energy efficiency improvement target

$$=\frac{32}{100-32}\times 100=47 \text{ pct.}$$

1972 energy factor: 3.80 ft³/kWh/d.
1980 energy factor: 5.59 ft³/kWh/d.
[1] 1980 energy factor = 1972 energy factor $\times\frac{100+\text{percent EEI}}{100}$.

Freezers

The proposed energy efficiency improvement target for freezers is 30 percent. The freezer design options that were selected to demonstrate the technological feasibility of the proposed target are: improving the compressor motor efficiency through the use of permanent split capacitor (PSC) motors, improving the insulation in freezers by using foam instead of fiberglass insulation, and providing an "on-off" control switch for the antisweat heater, when an antisweat heater is used as a condensation control device. The production-weighted energy savings of each design option described above for freezers, and the estimated lead time required for implementation are presented in Table 3.

TABLE 3.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for freezers*

Recommended design options	Production weighted energy savings (percent)	Lead time for implementation (years)
1. Improve compressor motor efficiency	9	2
2. Improve insulation	11	2
3. Provide on-off switch for anti-sweat heaters	3	1
Aggregate	23	

1980 energy efficiency improvement target

$$=\frac{23}{100-23}\times 100=30 \text{ pct.}$$

1972 energy factor: 4.32 ft³/kWh/d.
1980 energy factor: 5.62 ft³/kWh/d [1].

[1] 1980 energy factor = 1972 energy factor $\times\frac{100+\text{pct EEI}}{100}$.

Dishwashers

The proposed energy efficiency improvement target for dishwashers is 25 percent. The dishwasher design options that were selected to demonstrate the technological feasibility of the proposed energy efficiency improvement target are: a switch to deactivate the optional hot drying of the dishes after the last rinse and before the drying heater is activated; the elimination of one rinse cycle from the normal wash cycle; changing the washing chamber geometry to lower water usage; and improving the accuracy of water fill controls to reduce overfilling. The production-weighted energy savings of each design option described above and the estimated lead time required for implementation are presented in Table 4.

TABLE 4.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for dishwashers*

Recommended design options	Production-weighted energy savings (percent)	Lead time for implementation (years)
1. Optional hot dry	3.0	1.0
2. Reduce one rinse cycle	5.6	1.5
3. Change in geometry	7.1	2.0
4. Improved fill controls	3.9	2.0
Aggregate	20	

1980 energy efficiency improvement target

$$=\frac{20}{100-20}\times 100=25\text{pct.}$$

1972 energy factor = 0.243 loads/kWh.
1980 energy factor = 0.304 loads/kWh. [1]

[1] 1980 Energy factor = 1972 energy factor $\times\frac{100+\text{percent EEI}}{100}$.

Clothes Dryers

The proposed energy efficiency improvement target for clothes dryers is 11 percent. To arrive at this target, the determination was made that gas dryers could be improved by 18 percent, and electric dryers by 8 percent.

The gas clothes dryer design option that was selected to demonstrate the technological feasibility of the proposed energy efficiency improvement target is the elimination of the gas pilot light by utilizing an automatic ignition system. The electric clothes dryer design options that were selected to demonstrate the technological feasibility of the proposed target are: The attachment of insulation to the inside surfaces of the clothes dryer and improvement of the electric heating-element efficiency through design changes which improve the heat transfer characteristics between the heating surface and the dryer drum.

The production-weighted energy savings of each design option described above for clothes dryers, and the estimated lead time required for implementation are presented in Tables 5 and 6. The data in Table 7 were used in the methodology discussed above to determine the proposed energy efficiency improvement target of 11 percent for clothes dryers

TABLE 5.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for gas-fueled clothes dryers*

Recommended design option	Production-weighted energy savings gas dryers (percent)	Lead time for implementation (years)
1. Eliminate pilot	15	1
Aggregate	15	

1980 energy efficiency improvement target

$$=\frac{15}{100-15}\times 100=18 \text{ pct.}$$

1972 energy factor = 1.96 lbs/kWh.
1980 energy factor = 2.31 lbs/kWh. [1]

[1] 1980 energy factor = 1972 energy factor $\times\frac{100+\text{percent EEI}}{100}$.

TABLE 6.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for electric-fueled clothes dryers*

Recommended design options	Production-weighted energy savings electric dryers (percent)	Leadtime for implementation (years)
1. Add insulation	5	2
2. Improve electric heater	2	2
Aggregate	7	

1980 energy efficiency improvement target

$$=\frac{7}{100-7}\times 100=8 \text{ pct.}$$

1972 energy factor = 2.64 lbs/kWh.
1980 energy factor = 2.85 lbs/kWh. [1]

[1] 1980 energy factor = 1972 energy factor $\times\frac{100+\text{percent EEI}}{100}$.

TABLE 7.—*Clothes dryer product type energy efficiency improvement target*

	1972 energy consumption $\times 10^{15}$ Btu	Percent of energy savings	Energy efficiency improvement target (percent)	1972 energy factor pounds per kilowatt-hour	1980 energy factor pounds per kilowatt-hour
Clothes dryers	15.70	10	11		
Gas clothes dryers	4.91	15	18	1.96	2.31
Electric clothes dryers	10.79	7	8	2.64	2.85

Water Heaters

The proposed energy efficiency improvement target for water heaters is 23 percent. To arrive at this target, the determination was made that gas water heaters could be improved by 25 percent, oil water heaters by 23 percent, and electric water heaters by 18 percent.

The gas water heater design options that were selected to demonstrate the technological feasibility of the proposed target are: Improved heat transfer, improved insulation of the storage tank, reduced factory setting of the thermostat and a detent on the controls at this setting, reduced energy input from the pilot light, and heat traps in the cold water inlet and hot water outlet piping. The oil water heater design options that were selected to demonstrate the technological feasibility of the proposed target are: improved heat transfer, improved insulation of the storage tank, reduced factory setting of the thermostat and a detent in the controls at this setting, ignition system improvements, combustion and burner efficiency improvements, and heat traps in the cold water inlet and hot water outlet piping. The electric water heater design options that were selected to demonstrate the technological feasibility of the proposed target are: improved insulation of the storage tank, reduced factory setting of the thermostat and a detent in the controls at this setting, and heat traps in the cold water inlet and hot water outlet piping.

The production-weighted energy savings of each design option described above for gas, oil and electric water heaters, and the estimated lead time required for implementation, are presented in Tables 8, 9, and 10. The data in Table 11 were used in the methodology discussed above to determine the proposed energy efficiency improvement target of 23 percent for water heaters.

TABLE 8.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for electric water heaters*

Design option	Estimated production-weighted energy savings (percent)	Lead time for implementation (years)
1. Increased or improved insulation	8.0	2
2. Reduced thermostat setting	6.0	0
3. Heat trap	2.0	1
Aggregate	[1] 15.0	

1980 energy efficiency improvement target

$$= \frac{15}{100-15} \times 100 = 18 \text{ pct.}$$

1972 energy factor: 80 pct.
1980 energy factor: 95 pct.[2]

[1] These values are not additive. Refer to the water heater technical background paper.
[2] 1980 energy factor = 1972 energy factor

$$\times \frac{100 + \text{percent EEI}}{100}$$

TABLE 9.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for gas fueled water heaters*

Design option	Estimated [1] production-weighted energy savings (percent)	Lead time for implementation (years)
1. Improved heat transfer	6.0	1
2. Increased or improved insulation	8.0	2
3. Reduced thermostat setting	5.0	0
4. Reduced pilot rate	2.0	0.5
5. Heat trap	1.0	1
Aggregate	[1] 20.0	

1980 energy efficiency improvement target

$$= \frac{20}{100-20} \times 100 = 25 \text{ pct.}$$

1972 energy factor: 44 pct.
1980 energy factor: 55 pct.[2]

[1] These values are not additive. Refer to the water heater technical background paper.
[2] 1980 energy factor = 1972 energy factor $\times \frac{100 + EEI}{100}$.

TABLE 10.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for oil fueled water heaters*

Design option	Estimated [1] production-weighted energy savings (percent)	Lead time for implementation (years)
1. Improved heat transfer	1.3	1
2. Increased or improved insulation	8.0	2
3. Reduced thermostat setting	5.0	0
4. Ignition system improvement	2.0	0.5
5. Combustion and burner improvements	2.6	1-3
6. Heat trap	1.0	1
Aggregate	[1] 19	

1980 energy efficiency improvement target

$$= \frac{19}{100-19} \times 100 = 23 \text{ pct.}$$

1972 energy factor: 46 pct.
1980 energy factor: 57 pct.[2]

[1] These values are not additive. Refer to the water heater technical background paper.
[2] 1980 energy factor = 1972 energy factor

$$\times \frac{100 + \text{percent EEI}}{100}.$$

TABLE 11.—*Water heater product type energy efficiency improvement target*

	1972 energy consumption $\times 10^{12}$ Btu	Percent of energy savings	Energy efficiency improvement target (percent)	1972 energy factor (percent)	1980 energy factor (percent)
Water heaters	176.91	19	23		
Electric water heaters	49.6	15	18	80	94.4
Gas water heaters	125.6	20	25	44	55.0
Oil water heaters	1.71	19	23	46	56.6

Room Air Conditioners

The proposed energy efficiency improvement target for room air conditioners is 30 percent. The room air conditioner design options that were selected to demonstrate the technological feasibility of the proposed target are: installation of a fan switch, improvement of fan motor efficiency, improvement of compressor efficiency, and improvement of cycle efficiency. A preliminary value of energy savings for the fan switch has been established on the basis of available information and calculations. The contribution of this innovative feature may be modified on the basis of information received in this proposed rulemaking. FEA may amend the room air conditioner test procedure to measure the contribution of the fan switch if the information received demonstrates that it saves energy with typical consumer usage. The production-weighted energy savings of each design option described above and the estimated lead time required for implementation are presented in Table 12.

TABLE 12.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for room airconditioners*

Recommended design options	Production-weighted energy savings (percent)	Estimated lead time for implementation (years)
1. Install a switch to cycle fan with compressor	[1] 5	0.5
2. Improve fan motor efficiency	3	.5
3. Improve compressor efficiency	5	1.0
4. Improve cycle efficiency	10	1.0
Aggregate	23	

1980 energy efficiency improvement target

$$= \frac{23}{100-23} \times 100 = 30 \text{ pct.}$$

1972 energy efficiency ratio: 6.51 Btu/kWh.
1980 energy efficiency ratio: 8.46 Btu/kWh.[2]

[1] Value to be modified as required on the basis of information received from this proposal.
[2] 1980 energy factor = 1972 energy factor

$$\times \frac{100 \times \text{percent EEI}}{100}.$$

Home Heating Equipment, Not Including Furnaces

The proposed energy efficiency improvement target for vented home heating equipment is 13 percent. To arrive at this target, the determination was made that vented gas heaters could be improved by 14 percent, and vented oil heaters could be improved by 12 percent. Unvented home heating equipment is considered to be 100 percent efficient at the point of end use.

The vented gas heater design options that were selected to demonstrate the technological feasibility of the proposed target are improved heat transfer, electric ignition, and a flue damper. The vented oil heater design options that were selected to demonstrate the technological feasibility of the proposed target are improved heat transfer, flue damper, and power burner system with forced air.

The production-weighted energy savings of each design option described above for gas and oil vented heaters, and the estimated lead time required for implementation are presented in Tables 13 and 14. The data in Table 15 were used in the methodology discussed above to determine the proposed energy efficiency improvement target of 13 percent for vented home heating equipment.

TABLE 13.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for gas fueled heaters*

Design option	Estimated [1] production-weighted energy savings (percent)	Lead time for implementation (years)
1. Improved heat transfer	7.6	1.0
2. Electric ignition	1.2	1.5
3. Flue damper	3.5	2.5
Aggregate	12	

1980 energy efficiency improvement target

$$= \frac{12}{100-12} \times 100 = 14 \text{ pct.}$$

1972 energy factor: 53 pct.
1980 Energy Factor: 60.4 pct. [1]

[1] 1980 energy factor = 1972 energy factor

$$\times \frac{100 + \text{percent EEI}}{100}.$$

TABLE 14.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for oil fueled heaters*

Design option	Estimated production-weighted energy savings (percent)	Lead time for implementation (years)
1. Improved heat transfer	5.0	2
2. Flue damper	3.3	2
3. Power burner system	2.2	2
Aggregate	11	

1980 energy efficiency improvement target

$$=\frac{11}{100-11}\times 100=12 \text{ pct.}$$

1972 energy factor: 41 pct.
1980 energy factor: 45.7 pct.

[1] 1980 energy factor = 1972 energy factor

$$\times\frac{100+\text{percent EEI}}{100}.$$

TABLE 15.—*Vented home heating equipment product type energy efficiency improvement target*

	1972 energy consumption $\times 10^{13}$ Btu	Percent of energy savings	Energy efficiency improvement target (percent)	1972 energy factor (percent)	1980 energy factor (percent)
Vented heaters	30.63	12	13		
Gas heaters	22.40	12	14	53	60.4
Oil heaters	8.23	11	12	41	45.7

Television Sets

The proposed energy efficiency improvement target for television receivers is 79 percent. To arrive at this target, the determination was made that monochrome televisions could be improved by 186 percent, and color televisions could be improved by 54 percent.

The television design options that were selected to demonstrate the technological feasibility of the proposed target are the elimination of the instant-on feature and a 100 percent changeover to solid state circuitry. The production-weighted energy savings of each design option for color and monochrome television receivers, and the estimated lead time required for implementation, are presented in Tables 16 and 17. The data in Table 18 were used in the methodology discussed above to determine the proposed energy efficiency improvement target of 79 percent for television receivers.

TABLE 16.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for monochrome television receivers*

Design option	Estimated production-weighted energy savings (percent)	Estimated lead time for implementation
1. Changeover to 100 pct solid state circuitry	52	[1] 0
2. Elimination of instant-on	13	[1] 0
Aggregate	65	

1980 energy efficiency improvement target

$$=\frac{65}{100-65}\times 100=186 \text{ pct.}$$

1972 energy factor: 35 pct.
1980 energy factor: 100 pct.
[1] Changeover in progress.
[2] 1980 energy factor = 1972 energy factor

$$+\frac{100\times\text{pct EEI}}{100}.$$

TABLE 17.—*Summary of energy efficiency improvement (EEI) target calculations for color television receivers*

Design option	Estimated production-weighted energy savings (percent)	Estimated lead time for implementation
1. Changeover to 100 pct. solid state circuitry	28	[1] 0
2. Elimination of instant-on	7	[1] 0
Aggregate	35	

1980 energy efficiency improvement target

$$=\frac{35}{100-35}\times 100=54 \text{ pct.}$$

1972 energy factor: 65 pct.
1980 energy factor target: [2] 100 pct.

[1] Changeover in progress.
[2] 1980 energy factor = 1972 energy factor

$$\times\frac{100+\text{percent EEI}}{100}.$$

TABLE 18.—*Television receiver product type energy efficiency improvement target*

	1972 energy consumption $\times 10^{15}$ Btu	Percent of energy savings	Energy efficiency improvement target (percent)	1972 energy factor (percent)	1980 energy factor (percent)
Television receivers	16.70	44	79		
Monochrome TV	4.83	65	186	35	100
Color TV	11.87	35	54	65	100

Kitchen Ranges and Ovens

The proposed energy efficiency improvement target for kitchen ranges and ovens is 64 percent. To arrive at this target, the determination was made that gas kitchen ranges and ovens could be improved by 104 percent, electric kitchen ranges and ovens by 3 percent, and microwave ovens by 5 percent.

The gas kitchen range and oven design options that were selected to demonstrate the technological feasibility of the proposed target are the elimination of continuous burning pilots and the reduction of flue gas losses from the oven. The electric kitchen range and oven design options that were selected to demonstrate the technological feasibility of the proposed target are increasing the insulation in the walls of the oven, and improving the oven door seals. The microwave oven design options that were selected to demonstrate the technological feasibility of the proposed target include improved oven linings, improved power sources, reduction in the power requirements of features such as lights and timers in the microwave oven, and improved coupling between the magnetron and the food.

The production-weighted energy savings of each design option described above, and the estimated lead time required for implementation, are presented in Tables 19, 20, and 21. The data in Table 22 were used in the methodology discussed above to determine the proposed energy efficiency improvement target of 64 percent for kitchen ranges and ovens.

TABLE 19.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for electric kitchen ranges and ovens*

Design option	Estimated production-weighted energy savings (percent)	Lead time for implementation (years)
1. Improve oven insulation	3	2
2. Improve oven door seal	1	(1)
Total	4	
Penalty to meet safety regulations	[2] −1	
Aggregate	3	

1980 energy efficiency improvement target

$$=\frac{3}{100-3}\times 100=3 \text{ pct.}$$

1972 energy factor: 39.41.
1980 energy factor: 40.59.[3]

[1] Less than 1 yr.

[2] Discussions with the industry and limited test data indicate that average range energy efficiencies have decreased since 1972, due to design changes that have been made to meet safety regulations to lower range surface temperatures. It has been determined that an effort to optimize the requirements to improve the energy efficiency of the range and meet the safety regulation will result in a limited negative impact on range energy efficiency.

[3] 1980 energy factor = 1972 energy factor

$$\times\frac{100+\text{percent EEI}}{100}$$

TABLE 20.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for gas kitchen ranges and ovens*

Design option	Estimated production-weighted energy savings (percent)	Lead time for implementation (years)
1. Elimination of continuous-burning pilot	47	2
2. Reduce excess flue gas losses	4	2
Aggregate	51	

1980 energy efficiency improvement target

$$=\frac{51}{100-51}\times 100=104 \text{ pct.}$$

1972 energy factor: 10.08.
1980 energy factor: 20.56.[1]

[1] 1980 energy factor = 1972 energy factor

$$+\frac{100+\text{percent EEI}}{100}.$$

TABLE 21.—*Summary of 1980 energy efficiency improvement (EEI) target calculations for microwave ovens*

Design options	Estimated production-weighted energy savings (percent)	Lead time for implementation (years)
1. Improved oven linings 2. Improved power source 3. Improved coupling between magnetion and food 4. Reduced feature power requirements	5	2
Aggregate	5	

1980 energy efficiency improvement target

$$=\frac{5}{100-5}\times 100=5 \text{ pct.}$$

1972 energy factor: 37.99.
1980 energy factor: 39.89.[1]

[1] 1980 energy factor = 1972 energy factor

$$\times\frac{100+\text{percent EEI}}{100}.$$

TABLE 22.—*Kitchen range and oven product type energy efficiency improvement target*

	1972 energy consumption $\times 10^{12}$ Btu	Percent of energy savings (percent)	Energy efficiency improvement target (percent)	1972 energy factor (percent)	1980 energy factor (percent)
1. Kitchen ranges and ovens	*34.72*	*39*	*64*		
Electric ranges/ovens	8.38	3	3		
Ranges	7.32	3	3	39.41	40.59
Cooking tops	.54	0	0	63.60	63.60
Ovens	.52	5	5	14.56	15.29
Gas ranges/ovens	26.24	51	104		
Ranges	24.35	51	104	10.08	20.56
Cooking tops	.92	53	113	16.63	35.42
Ovens	.97	48	92	3.64	6.99
Microwave ovens	.10	5	5	37.99	39.89

Clothes Washers

The proposed energy efficiency improvement target for clothes washers is 47 percent. The clothes washer design options that were selected to demonstrate the technological feasibility of the proposed energy efficiency improvement target are: the elimination of the warm rinse by closing off the hot water port and only supplying cold water during a rinse cycle, and the reduction of the water temperature at the warm temperature setting of the wash cycle. The production-weighted energy savings of each design option described above and the estimated lead time required for implementation are presented in Table 23.

TABLE 23.—*Summary of 1980 energy efficiency improvement (EEI) target calculation for clothes washers*

Recommended design option	Production-weighted energy savings (percent)	Lead time for implementation (years)
1. Eliminate warm rinse	23.6	1
2. Reduce warm temperature setting	8.0	
Aggregate	32	

$$\text{1980 efficiency improvement target} = \frac{32}{100-32} \times 100 = 47 \text{ pct.}$$

1972 energy factor: 0.198 load/kWh.
1980 energy factor: 0.291 load/kWh.
1980 energy factor: 0.291 load/kWh.[1]

[1] $\text{1980 energy factor} = \text{1972 energy factor} \times \frac{100+\text{percent EEI}}{100}$.

III. ECONOMIC ANALYSIS

A. METHODOLOGY FOR DETERMINING ECONOMIC FEASIBILITY

The economic feasibility analysis of today's proposal is complex because the analysis touches upon a vast array of demand-supply relationships which affect consumers not only in their purchasing decisions but also in their daily use of appliances. In performing this analysis, a comprehensive methodology for examining all significant and relevant economic effects was used in order to insure that the proposed targets maximize benefits, especially in the area of energy conservation, while minimizing any adverse consequences.

The analytical procedures used both to project trends and to quantify economic factors consisted of the application of econometrics, statistics and other mathematical methods. In assessing the role of consumer products within the economy, a micro-economic analysis was relied upon, as much as possible, to project trends and simulate changes which the proposed targets might induce. However, where either the lack of data or limited model structure prevented strict adherence to econometrics, the expertise of FEA played a large role.

Most economic factors are quantified in terms of 1980 prices and quantities because 1980 is the year in which impacts of the targets will generally first occur. The projection of prices and quantities for 1980 relies upon a combination of analytical procedures. One essential feature of these procedures is that the outcome, both for energy savings and for cost-benefit impacts, is not significanly altered by variance around these projections. The forecast of shipments, prices and other economic factors relating to 1980 provides a base case for quantifying possible impacts. If these projections are not accurate then the quantified impacts for various costs and benefits shift in a proportional manner. For example, variations in projected 1980 sales yield similar net benefits for consumers with negligible impact on long-term energy trends.

Various data sources were used in quantifying economic factors and in the analysis of economic possibilities. Primary data sources were Federal Government publications, including the Census of Manufacturers (U.S. Bureau of the Census, Industry Series, 1975) and Current Industrial Reports (U.S. Bureau of the Census, 1973), together with private sector publications such as Appliance Manufacturer (Data Chase Publications Inc., 1975) and Merchandising Week (Billboard Publication Inc., 1972–75). Another source of data was testimony submitted at May and June 1976 hearings on subpart C as previously proposed (41 FR 19977, May 14, 1976), as well as the written comments received in response to that proposal.

The structure of the methodology consists of establishing a definition of economic feasibility, and conducting a four-stage analysis which quantifies all relevant economic factors. Use of this methodology by FEA should not preclude interested parties from suggesting different methodologies, but such suggestions should include a clearly defined methodology along with verified quantifications. Presentations from respondents are encouraged, since a thorough understanding of all relevant economic factors is necessary in prescribing economically feasible targets for consumer products.

A proposed energy efficiency improvement target for a particular consumer product (or aggregate set of consumer products) is economically feasible when:

1. Appropriate economic resources are available for production and shipment of the more energy-efficient consumer product (or aggregate set of consumer products), and

2. Either benefits exceed costs of implementing the proposed targets, or negative impacts are not of substantial consequence.

Economic resources are considered available when manufacturers can obtain necessary scarce or imported materials to implement energy improvements, and can secure sufficient capital to finance the required investment in plant and equipment, and to finance other costs, including materials. In addition, when costs of implementing and utilizing more energy-efficient consumer products are outweighted by the dollar value of benefits, the target is considered to be economically feasible. Where, however, costs exceed benefits, and both energy savings are substantial and economic impact on overall economic trends is not of substantial consequence, then the proposed target remains economically feasible. An economic impact is not of substantial consequence when it does not alter a reasonable projected path of stable growth by an appreciable margin in a manner which causes undue stress or burden to some sector of the economy.

FEA applied this definition first to each individual type of product, and then to the entire set of products specified in paragraphs (1) through (10) of section 322(a) of the Act. The first criterion of the definition, which involves an examination of scarce material supply and investment requirements, is analyzed in stage two of the analysis. The second criterion, which involves the quantification of costs and benefits associated with proposed targets, is analyzed in stages three and four of the analysis, where effects on employment, production, prices, demand, energy, investment and market structure are also quantified. The first stage of the analysis relates energy savings design options to basic economic factors upon which the other stages depend.

Stage I.—Integration of design options with economic impacts. Certain technological engineering factors are accepted as given for the purpose of the economic analysis. These technological factors include the set of design options discussed in Part II above, with corresponding material requirements and resulting energy efficiency improvements for each consumer product. The economic analysis derives a cost estimate for implementing each design option by pricing required materials along with costs for labor and overhead when these are considered important elements in the redesign. The

energy savings attributable to the individual design options, and their costs, are combined so as to account for any overlapping energy savings, in order to arrive at an overall energy improvement and total cost increase. The increase in total cost is then translated into an increase in purchase price. Evidence of current price differentials for products already incorporating energy efficient design options was used where appropriate. In this manner, the price increase per unit is directly linked to technical design options and energy efficiency improvements.

The per unit price increase is further adjusted in two ways. First, the per unit price increase is production-weighted, as are energy efficiency improvements, according to 1972 and 1980 shipment characteristics. For each consumer product, the percentage of 1972 shipments incorporating a particular design option is subtracted from the projected percentage of 1980 shipments incorporating the same design option, resulting in the percentage increase in products marketed with a specific design option in 1980 over 1972. This net increase in percentage of improved products between base period and target date is multiplied by the appropriate design option price increase, yielding a production-weighted price increase by design option. The production-weighted price increase for each design option is summed for all design options to arrive at a production-weighted price increase for the consumer product.

The second adjustment is the calculation of the production-weighted price increase expressed in 1980 prices. Because recent available retail prices were most often 1975 prices, an inflation rate of about 3 percent per year, compounding to 15.9 percent, was used to inflate 1975 prices into 1980 prices. Although an annual price rise of 3 percent is lower than projected inflation in the economy, it is in line with past consumer product price trends, which typically rise at a significantly lower rate than inflation.

For the aggregate set of consumer products, the production-weighted price increase in 1980 is multiplied by projected 1980 shipments to derive the total additional consumer cost of achieving the proposed targets. Projected unimproved consumer product prices multiplied by base-case projected 1980 shipments yields an initial unimproved purchase cost that is compared to the increased purchase cost of improved products for evaluating the impact on demand and supply relationships.

Stage II.—Availability of economic resources. This stage of the analysis evaluates the sufficiency of economic resources, including materials and capital, to permit the manufacture and shipment of the more energy-efficient consumer products. The particular investment requirements described in this evaluation are not meant to prescribe for manufacturers a necessary investment or financial procedure. Although particular manufacturing and financial factors are presented along with their impacts, the purpose of this analysis is only to demonstrate one economically feasible approach in the achievement of the proposed targets.

This evaluation relies essentially upon the given technological factors to define material requirements. Each design option is related to the number of pounds of material per unit. Per unit material requirements are aggregated by using production-weighted percentages such as were used for price increases. Total material changes from incorporating design options is the product of 1980 shipments and production-weighted changes. Total material changes are expressed as a percent of U.S. total to assess potential impact. If the material impact is judged to be nonsignificant then it is considered to be an available economic resource.

For the set of 10 consumer products, material changes are summed. Total material changes for all 10 consumer products are expressed as a percent of U.S. total to assess potential scarce material impact and to determine impact by industry, if any, with respect to plant operating capacity, investment and employment. If the material impact is judged either to be nonsignificant relative to total U.S. production and imports, or easily supplied by the respective industry, then that material is considered to be an available economic resource.

Investment requirements are also analyzed in stage two. First, investment requirements are estimated for a typical size manufacturing firm. A typical size firm is considered to be one which has a market share equal to or better than the average market share of all firms manufacturing the product. The necessary investment resources are considered to be available if the financial status of a typical firm manufacturing the particular product is adequate to undertake the investment. Second, the availability of sufficient funds for the entire industry is evaluated by aggregating the investment requirements of all firms in the industry. The aggregation of investment at the industry level is calculated by multiplying the investment required by a typical firm times the number of firms estimated to account for over 90 percent of the market wherever possible. The additional investment for the industry is compared to recent investment trends by the industry itself to assess the possible burden. Also, the availability of funds in the financial market is evaluated by contrasting the additional industry needs with manufacturers' performance in terms of growth and profitability. If the financial position of manufacturers of a consumer product is adequate to obtain necessary funds, then investment requirements are considered to be an available resource.

For the aggregate set of products, investment requirements are examined collectively with respect to the number of firms supplying each product and their general financial position. Growth and profitability of firms which collectively account for over 90 percent of market share, where possible, are evaluated with respect to total investment requirements. If the financial position of the group of industries is adequate to secure funds from the capital market, then investment requirements are considered to be an available economic resource.

Stage III.—Cost-benefit tradeoffs and energy consumption. This stage of the analysis examines the cost-benefit tradeoff confronting consumers of household appliances, along with corresponding energy savings. The tradeoff is essentially a measurement of net life cycle benefits from the perspectives of both an individual purchaser and all household sector purchasers. These purchase decisions determine net energy savings, which are quantified by comparing the reduced energy consumption in the normal operation of the product and the possible greater energy consumed in the manufacture of a more efficient product.

First, costs and benefits to the household sector are evaluated. Net life cycle benefits are derived both for individual purchases of a more energy-efficient product and for total consumer purchases by product and by set of products. The premise underlying both perspectives is that a more energy-efficient consumer product typically sells for a higher price but operates at a lower cost, since less energy is required to perform the same task. Future dollar savings from lower operating costs are accumulated over the life of the product (or set of products) and expressed in present dollars by discounting future dollar flows. The discounting formula is based on a 10 percent interest rate and an engineering estimate of product life. In this manner, a rational consumer can compare, dollar for dollar, the current value of future operating savings with the increase in purchase price of the more energy-efficient product.

The benefit derived from the present value of life cycle operating savings is reduced by the increase in initial purchase price to determine net life cycle benefits. The present value of net life cycle benefits for individual purchasers is aggregated by using a projection of 1980 shipments by product. The 1980 shipment projection is assumed to equal all household purchases and provides the basis for quantifying reduced energy consumption, household savings and increased expenditures resulting from the household sector purchase and use of more efficient products which sell at a higher price but operate at a lower energy cost.

However, total energy savings is even greater than the amount of reduced consumption by the household sector. Reduced energy consumption is measured first at household end use in kilowatt-hours and second at utility plants in Btu's. The measurement of energy consumed by the utility is the actual energy content of fuel consumed in order ultimately to operate the consumer product in the home. The energy content of fuel delivered to the utility plant is about three times the delivered energy to the household due to losses of energy in generation and transmission. A con-

version factor of 10,600 Btu's/kWh (FEA conversion factor) is used to convert household energy in kWh's into energy expended by the utility plant in Btu's. For each one kWh, which is equivalent to 3412 Btu's, saved by the household, approximately 10,600 Btu's are saved by the utility.

The measurement of energy consumed by the utility is further converted into barrels of crude petroleum by using a conversion factor of 5.6 million Btu's per barrel. However, simply because reduced energy consumption is equivalently measured in quantity of crude petroleum, this does not imply that either imports or domestic production of petroleum will decline by a similar amount, since only about 20 percent of energy supplied to utilities is in the form of petroleum fuel. But overall reduction in household energy consumption will proportionately make available for more productive uses supplies of petroleum, coal and natural gas, especially in industry.

Stage IV.—Assessment of negative impact on demand and employment. The last stage of the analysis quantifies impacts within and between household and manufacturing sectors. This stage is primarily an evaluation of possible substantial negative impacts but, where appropriate, costs are offset by benefits. The analysis examines the potential impact of shifts in household demand on production and employment. Other areas of potential negative impacts include industry structure and income groups.

The purpose of this stage is to examine, for each of the consumer products, changes in demand-supply relationships in terms of economic feasibility. The study of the interaction of demand-supply relationships within and between the household and manufacturing sectors yields costs, benefits and impacts of energy efficiency targets. The extent to which costs, benefits and impacts vary depends essentially upon two factors.

1. The extent to which manufacturing costs, including substituted materials, new investment in plant and equipment and additional financing costs, increase purchase price.

2. The degree to which household demand for consumer products varies with respect to higher prices on the one hand but lower operating costs on the other.

The higher the manufacturing cost requirements to implement proposed targets, the greater the negative impact from higher prices on household demand, employment, production, inflation and market structure. Negative impacts are, however, viewed in relative terms since, although they may be significant, such impacts may also be outweighed by favorable benefits consisting of either reduced energy consumption on the demand side or innovative manufacturing techniques on the supply side. In contrast, the lower the manufacturing cost requirements, the greater the opportunity for energy savings, enhanced household purchasing power, and negligible negative impacts.

This fourth stage of the analysis initially evaluates the possible changes in aggregate demand along with the resulting impact on production, employment and market structure. The analysis examines possible deviations from the 1980 base case shipment projection in order to assess possible substantial negative impacts resulting from the achievement of the proposed energy efficiency targets. The 1980 base case projection of shipments and purchases was used as the most reasonable basis and best approximation for quantifying material and energy impacts along with life cycle benefits discussed in stages two and three. Thus, even though possible negative impacts might cause a deviation around the base case projection, the previously qualified impacts would not be substantially altered. The reasonableness of using the 1980 base case projections in stages two and three stems, in part, from an assumption that between 1972 and 1980 manufacturers will have introduced higher-priced, more efficient products in a progressive manner so that households are not suddenly faced with a one time jump in prices of more energy efficient products in 1980. If the latter assumption holds true, the negative impacts would not be of material consequence since they would be spread over a number of years and in essence diluted by other economic factors.

However, in order to measure the possibility of more substantial negative impacts, this methodology in stage four further analyzes an alternative case in which households react to a sudden jump in 1980 prices of more energy-efficient products. The extent to which demand shifts in response to a sudden jump in prices is subject to continuing fluctuation as the relative prices of purchasing and operating the product change, along with changes in awareness and preception of future price trends. For these reasons, a plausible maximum-minimum range of household response to higher prices is presented. For example, where rational consumers compare life cycle operating savings to increased purchase price and the positive impact from operating savings outweighs the negative impact from higher purchase price then demand could, in fact, exceed the 1980 base case projections. But, where life cycle operating savings are ignored, demand could fall below the base case projection. It is these two plausible consumer preceptions which are captured by a maximum-minimum range.

FEA has determined that the minimum negative impact is the most plausible case for several reasons. First, the quantification of shifts in both demand and employment does not fully consider the positive effect that a successful consumer education and labeling program might have on increasing consumer preference for low energy usage products with the ultimate effect of outweighing the negative effects of purchase price elasticity. Also, recent structural changes in consumer preferences between purchase price and operating cost have not been given appropriate weighting since time series used in this analysis of relative price elasticities primarily reflect attitudes before the 1973 energy crisis. On this basis, it is concluded that the fall in demand with attendant employee layoffs may approach the minimum negative impact but that it is temporary (most probably less than a year).

In order to examine the responsiveness of households to higher-priced, more energy-efficient products, a demand function was developed for each of the 10 consumer products. Historical time series were relied upon to quantify changes in household purchases with respect to changes in product prices, energy prices, real income, housing starts, household stock and other relevant economic factors. These equations, correlated in logarithmic form, measure the responsiveness between quantity purchased as it relates to product purchase price on the one hand and quantity purchased as it relates to energy usage price on the other. Correlation analysis of the logarithm of quantity purchased (the dependent variable) together with the logarithm of purchase price, energy price, and other related parameters yields coefficients which are the pertinent elasticities. The two key elasticities are purchase price and energy price.

A product price elasticity of one indicates that for every 1 percent increase in product purchase price, quantity purchased declines by 1 percent. If product purchase price elasticity is less than one, then a 1 percent increase in product purchase price generates something less than a 1 percent decline in quantity purchased. If price elasticity is greater than one, however, then a 1 percent increase in product purchase price generates something greater than a 1 percent decline in quantity purchased.

The relationship between the number of units purchased and operating cost elasticity of a particular product is the reverse of the demand elasticity. It is assumed that energy price elasticity derived from regression analysis is similar to operating cost elasticity. Large savings in operating costs directly correlate with lower energy usage prices. For an energy price (or operating cost) elasticity larger than one, a reduction in the operating cost of a particular product will result in a greater increase in the quantity purchased than would result if the energy price elasticity were one or less. The lower the energy usage price elasticity (less than one), the less will be the positive effect of increased efficiency on the quantity purchased. The positive effect on quantity purchased due to operating savings, compared to the negative effect on quantity purchased due to higher prices are netted to derive a corresponding increase or decrease in quantity purchased by households.

The impact of shifting household demand on employment is the direct consequence of a net increase or decrease in quantity purchased. The net change in quantity purchased is expressed as a percent of 1980 projections of sales. The percent increase or decrease in quantity purchased is assumed to equal the corresponding percent increase or decrease in direct employment. This is an assump-

tion based on available information. Direct employment is the number of production workers in the appropriate industry. If the industry SIC category of production workers according to Bureau of Census Standard Industrial Codes does not match the consumer product being evaluated, then the ratio of dollar value of shipments of a consumer product to shipments of the SIC industry as a whole is used to apportion industry production workers to correspond to consumer product classification. To determine the net effect on employment, the effects for each product were summed.

Two other concerns which are examined in terms of potential negative impact are industry structure and income groups. With respect to industry structure, typical size firms are compared to smaller firms for each product and for the set of products in order to evaluate possible bias against smaller firms. Smaller firms are examined in light of their cost structure and market share. If the investment requirements or other factors do not appear to cause dramatic shifts in industry structure, then the negative impact on small firms is considered to be not of substantial consequence.

With respect to income groups, the burden on lower income purchasers is examined for possible unfavorable bias. If the percentage increase in purchase price for lower income groups does not appear to exceed that for higher income groups by a significant amount, then the negative impact on small firms is con- of substantial consequence.

B. ECONOMIC ANALYSIS OF EACH PRODUCT

Summaries of the economic analysis performed with respect to each product are presented in this notice. The analyses themselves are available for inspection as provided for later in this notice.

The proposed energy efficiency improvement target for each product is the maximum improvement which FEA has determined is economically and technologically feasible. The determination of economic feasibility of each proposed target is the result of an economic analysis which is consistent with the methodology presented above. The format of the analyses as well as of the summaries of the analyses is as follows:

Stage I. The cost of implementing each design option, with attendant energy improvement, cumulates to a total price increase and energy savings. The total per-unit price increase yields a production-weighted price increase in current prices and in 1980 prices.

Stage II. Both scarce materials and investment funds are analyzed to determine whether they are sufficiently available to permit the implementation of the proposed target.

The raw materials primarily affected by a proposed target are stated, and the change in demand is quantified and given as a percent of the U.S. total. It is then determined whether the industry can meet demand shifts without limiting domestic supplies or significantly increasing imports.

A determination is made whether profitability and growth of the major manufacturers are adequate to finance total industry investment, and amounts per firm are stated for research and development along with capital costs. Investment requirement per firm is the cumulative cost of each design option based in part on the May and June 1976 testimony and comments.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient products, resulting in measurable energy savings.

The purchase of projected 1980 shipments complying with the proposed target initially is more expensive for consumers, but lower life cycle operating costs yield a net benefit to the consumer, calculated on present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings expressed in kWh's, which is then expressed in equivalent Btu's of utility energy supply. Total energy savings of these 1980 shipments is then aggregated in kWh's or Btu's over the life of an average product.

Stage IV. Negative impacts from implementation of proposed targets are then evaluated as to whether they are of substantial consequence based on available information.

Negative impact on demand, production and employment is examined with respect to the base case projection. The minimum negative impact is judged to be the most plausible case since it most probably reflects recent and future consumer perceptions.

Possible shift in industry market structure which might threaten the existence of small firms is examined.

The effect upon the lowest income quartile is examined to consider whether that quartile is paying a proportionately larger price increase for more efficient products.

Refrigerators and Freezers

FEA, in a manner consistent with the methodology presented above, has determined that the proposed efficiency improvement target of 47 percent for refrigerators and refrigerator-freezers is the maximum improvement which is technologically and economically feasible. A summary of economic findings for refrigerators and refrigerator/freezers follows:

Stage I. The total price increase resulting from implementation of the selected design options is $47.75 per unit which yields a production-weighted price increase of $39.00 in current prices and $45.20 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for refrigerators and refrigerator-freezers.

The scarce materials primarily affected by the proposed target are fiberglass, for which demand declines by 39 thousand tons or about 10 percent of the U.S. total, and urethane foam, for which demand increases by 39 thousand tons or about 19 percent of the U.S. total. In both cases, the respective industries can meet demand shifts without limiting domestic supplies or significantly increasing imports.

Profitability and growth of the major manufacturers is adequate to finance total industry investment of $7.5 million, which amounts to slightly more than $1 million per firm in additional research and development along with capital costs. The investment requirement per firm is the cumulative cost of each design option based in part on the May–June 1976 testimony and comments. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $76 million.

State III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient refrigerators and refrigerator-freezers, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 7.1 million refrigerators and refrigerator-freezers complying with the proposed target initially costs household an additional $321 million but lowers life cycle operating costs by $1,501 million, yielding a net benefit of $1,180 million calculated on present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in energy savings of 4.0 billion kWh's annually, which is equivalent to 42 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is almost 60 billion kWh's, or 635 trillion Btu's over the 15-year life of an average refrigerator and refrigerator-freezer.

Stage IV. Negative impacts from implementation of the proposed refrigerator and refrigerator-freezer target are not of substantial consequence.

Demand in 1980 might reasonably decline by 1.2 percent, or 85,200 refrigerators and refrigerator-freezers because of the higher purchase price of more efficient products.

Employment might temporarily decline by 280 production workers, or about 1 percent of refrigerator and refrigerator-freezer employment, in response to lower demand.

The threat of shifts in industry market structure which might affect the existence of small firms apparently does not exist for refrigerator and refrigerator-freezer manufacturers, since 97 percent of total market share is held by seven sizeable firms, with the remaining 3 percent essentially held by imports.

The lowest income quartile may be negatively affected by paying a proportionately larger price increase for more efficient refrigerators and refrigerator-freezers, but available information suggests that this unfavorable bias is not of substantial consequence.

Freezers

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 30 percent for freezers is the maximum improvement which is technologically and eco-

nomically feasible. A summary of economic findings for freezers follows:

Stage I. The total price increase resulting from implementation of the selected design options is $48.00 per unit, which yields a production-weighted price increase of $33.00 in current prices and $38.30 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for freezers.

The scarce materials primarily affected by the proposed target are fiberglass, for which demand declines by about 10 thousand tons or 2.5 percent of the U.S. total, and urethane foam, for which demand increases by 10 thousand tons or about 5.0 percent of the U.S. total. In both cases, the respective industries can meet demand shifts without limiting domestic supplies or significantly increasing imports.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of $7 million, which amounts to about $1 million per firm in additional research and development along with capital costs. The investment requirements per firm is the cumulative cost for each design option based in part on the May-June 1976 testimony and comments. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $11.4 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient freezers, resulting in measureable energy savings.

The purchase and use of projected 1980 shipments of 1.8 million freezers complying with the proposed target initially costs households an additional $69 million but lowers life cycle operating costs by $215 million, yielding a net benefit of $146 million calculated on present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in energy savings of 0.6 billion kWh's annually, which is equivalent to 6.4 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is almost 9 billion kWh's, or 91 trillion Btu's over the 15-year life of an average freezer.

Stage IV. Negating impacts from implementation of the proposed freezer target are not of substantial consequence.

Demand in 1980 might reasonably decline by 16.0 percent, or 288,000 freezers, because of the higher purchase price of more efficient products.

Employment might temporarily decline by 905 production workers, or about 16 percent of freezer employment, in response to lower demand.

The threat of shifts in industry market structure which might affect the existence of small firms apparently does not exist for freezer manufacturers, since 93 percent of total market share is held by seven sizeable firms, with the remaining 7 percent of market share essentially held by either imports or subsidiaries of multiproduct corporations of considerable size.

The lowest income quartile may be negatively affected by paying a proportionately larger price increase for more efficient freezers, but available information suggests that this unfavorable bias is not of substantial consequence.

Dishwashers

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 25 percent for dishwashers is the maximum improvement which is technologically and economically feasible. A summary of economic findings for dishwashers follows:

Stage I. The total price increase resulting from implementation of the selected design options is $21.00 in current prices, both per unit and on a production-weighted basis and $24.00 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for dishwashers.

The scarce materials primarily affected by the proposed target are copper and plastics, for which demand increases by 78 and 20 tons respectively, a negligible amount. The respective industries can meet demand shifts without limiting domestic supplies or significantly increasing imports.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of $10.4 million, which amounts to slightly more than $1 million per firm in additional research and development along with capital costs. Investment requirements per firm is the cumulative cost for each design option based in part on the May–June 1976 testimony and comments. Alternative investment to produce an amount of energy equivalent to that which will be saved by the design options is $27.6 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient dishwashers, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 4.9 million dishwashers complying with the proposed target initially cost households an additional $117 million but lowers life cycle operating costs by $317 million, yielding a net benefit of $200 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in energy savings of 1.7 billion kWh's annually, which is equivalent to almost 18 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 18 billion kWh's, or almost 200 trillion Btu's, over the 11-year life of an average dishwasher.

Stage IV. Negative impacts from implementation of the proposed dishwasher target are not of substantial consequence.

Demand in 1980 might reasonably decline by 5.9 percent, or 289,000 dishwashers, because of the higher purchase price of more energy-efficient products.

Employment might temporarily decline by 437 production workers, or about 6 percent of dishwasher employment, in response to lower demand.

The threat of shifts in industry market structure which might affect the existence of small firms apparently does not exist for dishwasher manufacturers, since 93 percent of total market share is held by six sizeable firms, with the remaining 7 percent of market share essentially held by either imports or subsidiaries of multiproduct corporations of considerable size.

The lowest income quartile will not be negatively affected by paying a proportionately larger price increase for more efficient dishwashers, because available information suggests that all income groups pay approximately the same price for dishwashers.

Gas Clothes Dryers

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 18 percent for gas clothes dryers is the maximum improvement which is technologically and economically feasible. A summary of economic findings for gas clothes dryers follows:

Stage I. The total price increase resulting from implementation of the selected design options is $12.0¢ per unit, which yields a production-weighted price increase of $4.60 at current prices and $5.30 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for gas clothes dryers.

No scarce materials are significantly affected by the proposed target for gas dryers.

Profitability and growth of the major manufacturers adequate to finance the total industry investment of $405 thousand which amounts to about $60 thousand per firm in additional research and development along with capital costs. Investment requirements per firm is the cumulative cost for each design option based in part on the May–June 1976 testimony and comments. Alternative investment to produce an amount of energy equivalent to that which will be saved by the design options is $4.9 million.

Stage II. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient gas clothes dryers, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 1.0 million gas dryers complying with the proposed target initially costs households an additional $5 million but lowers life cycle operating costs by $15 million, yielding a net benefit of $10 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of

760 million cubic feet of natural gas, which is equivalent to almost one trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is about 10 billion cubic feet of natural gas, or 11 trillion Btu's, over the 15-year life of an average gas clothes dryer.

Stage IV. Negative impacts from implementation of the proposed gas clothes dryer target are not of substantial consequence.

Demand in 1980 might reasonably increase by 4.2 percent, or 42,000 gas dryers, because of a higher rate of replacement of more efficient gas dryers.

Employment might temporarily increase by 84 production workers, or about 4 percent of gas dryer employment, in response to higher demand.

The threat of shifts in industry market structure which might affect the existence of small firms apparently does not exist for gas dryer manufacturers, since 98 percent of total market share is held by seven sizeable firms, with the remaining 2 percent of market share essentially held by either imports or subsidiaries of multiproduct corporations of considerable size.

The lower income quartile may be negatively affected by paying a proportionately larger price increase for more efficient gas dryers, but available information suggests that this impact is not of substantial consequence.

Electric Clothes Dryers

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 8 percent for electric clothes dryers is the maximum improvement which is technologically and economically feasible. A summary of economic findings for electric dryers follows:

Stage I. The total price increase resulting from implementation of the selected design options is $4.50 in current prices, both per unit and on a production-weighted basis, and $5.20 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for electric dryers.

The scarce material primarily used to achieve the proposed target is fiberglass, for which demand increases by about 4,200 tons, or less than 1 percent of U.S. total. The industry can meet demand shifts without limiting domestic supplies or significantly increasing imports.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of about $800 thousand which amounts to almost $120 thousand per firm in additional research and development along with capital costs. Investment requirement per firm is the cumulative cost for each design option based in part on the May-June 1976 testimony and comments. Alternative investment to produce an amount of energy equivalent to that which will be saved by the design options is $4.9 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient electric dryers, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 4.2 million electric dryers complying with the proposed target initially costs households an additional $22 million but lowers life cycle operating costs by $114 million, yielding a net benefit of $92 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in energy savings of 300 million kWh's annually, which is equivalent to 3 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is over 4 billion kWh's, or 46 trillion Btu's over the 14-year life of an average electric dryer.

Stage IV. Negative impacts from implementation of the proposed electric clothes dryer target are not of substantial consequence.

Demand in 1980 might reasonably decline by less than 1 percent, or 25,000 electric dryers, because of the higher purchase price of more energy-efficient products.

Employment might temporarily decline by 31 production workers, or about 1 percent of electric dryer employment, in response to lower demand.

The threat of shifts in industry market structure which might affect the existence of small firms apparently does not exist for electric dryer manufactures, since 98 percent of total market share is held by seven sizeable firms, with the remaining 2 percent of market share essentially held by either imports or subsidiaries of multiproduct corporations of considerable size.

The lowest income quartile may be negatively affected by paying a proportionately larger price increase for more efficient electric dryers, but available information suggests that this impact is not of substantial consequence.

Electric Water Heaters

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 18 percent for electric water heaters is the maximum improvement which is technologically and economically feasible. A summary of economic findings for electric water heaters follows:

Stage I. The total price increase resulting from implementation of the selected design options is $23 per unit, which yields a production-weighted price increase of $16 in current prices and $18.50 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for electric water heaters.

The two scarce materials primarily affected by the proposed target are fiberglass, for which demand increases by 4,000 tons, or about 1 percent of U.S. total, and steel, for which demand increases by about 4,000 tons, a negligible amount. In both cases, the respective industries can meet demand shifts without limiting domestic supplies or significantly increasing imports.

Profitability and growth of manufacturers is adequate to finance the total industry investment of $1.4 million, which amounts to about $127 thousand per firm in additional research and development along with capital costs. Investment requirement per firm is the cumulative cost for each design option based in part on the May–June 1976 testimony and comments. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $61 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient electric water heaters, resulting in measureable energy savings.

The purchase and use of projected 1980 shipments of 4.1 million electric water heaters complying with the proposed target initially costs households an additional $76 million but lowers life cycle operating costs by $1,213 million, yielding a net benefit of $1,137 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 4 billion kWh's, which is equivalent to about 42 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 40 billion kWh's, or 424 trillion Btu's, over the 10 year life of an average electric water heater.

Stage IV. Negative impacts from implementation of the proposed electric water heater target are not of substantial consequence.

Demand in 1980 might reasonably decline by 5.2 percent, or 213 thousand electric water heaters because of the higher purchase price of more efficient products.

Employment might temporarily decline by 127 production workers, or about 5 percent of electric water heater employment, in response to lower demand.

The threat of shifts in industry market structure which might affect the survival of small firms does not appear to be a problem for electric water heater manufacturers, since a revenue base of about $6 million, or 1 percent of market share, is sufficient to finance investment requirements of the stated design options. Such a revenue base is typical of the small firms.

The lowest income quartile apparently will not pay a proportionately larger price increase than higher income groups for more efficient electric water heaters, because available information suggests that all income groups pay approximately the same price for electric water heaters.

Gas Water Heaters

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 25 percent for gas water heaters is the maximum improvement which is technologically and economically feasible. A summary of eco-

nomic findings for gas water heaters follows:

Stage I. The total price increase resulting from implementation of the selected design options is 24 per unit, which yields a production-weighted price increase of $17.00 in current prices and $19.70 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for gas water heaters.

The two scarce materials primarily affected by the proposed target are fiberglass, for which demand increases by about 3,000 tons, or about 1 percent of U.S. total, and steel, for which demand increases by 4,000 tons, a negligible amount. In both cases, the respective industries can meet demand shifts without limiting domestic supplies or significantly increasing imports.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of $2.6 million, which amounts to a little over $200 thousand per firm in additional research and development along with capital costs. Investment requirement per firm is the cumulative cost for each design option based in part on the May–June 1976 testimony and comments. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $109.8 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced more efficient gas water heaters, resulting in measureable energy savings.

The purchase and use of projected 1980 shipments of 3.1 million gas water heaters complying with the proposed target initially costs households an additional $61 million but lowers life cycle operating costs by $404 million, yielding a net benefit of $343 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of about 25 billion cubic feet of natural gas, which is equivalent to 28 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 246 billion cubic feet of natural gas, or 277 trillion Btu's, over the 10-year life of an average gas water heater.

Stage IV. Negative impacts from implementation of proposed gas water heater target are not of substantial consequence.

Demand in 1980 might reasonably increase by 4.7 percent, or 146 thousand gas water heaters, because of a higher rate of replacement by more efficient products.

Employment might temporarily increase by 134 production workers, or about ten percent of gas water heater employment, in response to greater demand.

The threat of shifts in industry market structure which might affect the survival of small firms does not appear to be a problem for gas water heater manufacturers, since a revenue base amounting to $5 million, or 1 percent of market share, is sufficient to finance investment requirements of stated design options. Such a revenue base is typical of the small firms.

The lowest income quartile apparently will not pay a proportionately larger price increase than higher income groups for more efficient gas water heaters, since available information suggests that all income groups pay approximately the same price for gas water heaters.

Oil Water Heaters

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 23 percent for oil water heaters is the maximum improvement which is technologically and economically feasible. A summary of economic findings for oil water heaters follows:

Stage I. The total price increase resulting from implementation of the selected design options is $38 in current prices, both per unit and on a production-weighted basis, and $44 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for oil water heaters.

No scarce materials are affected by the proposed target.

Profitability and growth of the manufacturers is adequate to finance investment of about $210 thousand per firm in additional research and development along with capital costs. The investment requirement per firm is the cumulative cost for each design option. Alternative investment to produce an amount of energy equivalent to that which will be saved by the design options is $900 thousand.

Stage III. Benefits exceed costs for the household sector in the purchase and use and higher-priced, more efficient oil water heaters, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 17 thousand oil water heaters complying with the proposed target initially costs households an additional $0.7 million but lowers life cycle operating costs by $3.3 million, yielding a net benefit of $2.6 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 0.9 million gallons of fuel oil, which is equivalent to 120 billion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 9.2 million gallons, or 1.2 trillion Btu's, over the 10-year life of an average oil water heater.

Stage IV. Negative impacts from implementation of the proposed oil water heater target are not of substantial consequence because the relatively small replacement demand shows signs of further declining below current low levels during the next decade. Comprehensive data concerning demand, employment and industry structure for oil water heaters are not presently available, but the data which are available imply that the impacts are not of substantial consequence.

Room Air Conditioners

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 30 percent for room air conditioners is the maximum improvement which is technologically and economically feasible. A summary of economic findings for room air conditioners follows:

Stage I. The total price increase resulting from implementation of the selected design options is $52 per unit, which yields a production-weighted price increase of $47 in current prices and $54.50 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for room air conditioners.

The scarce material primarily affected by the proposed target is aluminum, for which demand increases by about 9,000 tons, or 0.2 percent of U.S. total. The aluminum industry can meet the demand shift without limiting domestic supplies or significantly increasing imports.

Profitablity and growth of the major manufacturers is adequate to finance the total industry investment of $7.5 million, which amounts to about $500 thousand per firm in additional research and development along with capital costs. Investment requirement per firm is the cumulative cost for each design option based on part on the May–June 1976 testimony and comments. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $36.5 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient room air conditioners, resulting in measurable energy savings.

The purchase and use of projected 1980 shipmenst of 6.0 million room air conditioners complying with the proposed target initially costs households an additional $327 million but lowers life cycle operating costs by $729 million, yielding a net benefit of $402 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an anual energy savings of 1.9 billion kWh's, which is equivalent to 20 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 29 billion kWh's, or 380 trillion Btu's, over the 15-year life of an average room air conditioner.

Stage IV. Negative impacts from implementation of the proposed room air conditioner target are not of substantial consequence.

Demand in 1980 might reasonably decline by 18.7 percent, or 1.1 million room air conditioners, because of the higher purchase price of more efficient products.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient home heaters (gas vented), resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 700,000 home heaters (gas vented) complying with the proposed target initially costs households an additional $17 million but lowers life cycle operating costs by $55 million, yielding a net benefit of $38 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 2.7 billion cubic feet of natural gas, which is equivalent to 3 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 40 billion cubic feet of natural gas, or 45 trillion Btu's, over the 15-year life of an average home heater (gas vented).

Stage IV. Negative impacts from implementation of the proposed home heater (gas vented) target are not of substantial consequence.

Demand in 1980 might reasonably decline by 12.3 percent, or 86,000 home heaters (gas vented), because of the higher purchase price of more energy-efficient products.

Employment might temporarily decline by 460 production workers, or about 12 percent of home heater (gas vented) employment, in response to lower demand.

Employment might temporarily decline by 1,975 production workers, or about 19 percent for room air conditioner employment, in response to lower demand.

The threat of shifts in industry market structure which might affect the existence of small firms apparently does not exist for room air conditioner manufacturers, since 93 percent of total market share is held by 12 sizeable firms, with the remaining seven percent of market share essentially held by either imports or subsidiaries of multiproduct corporations of considerable size.

The lowest income quartile will not be negatively affected by paying a proportionately higher price for more efficient room air conditioners, because available information suggests that all income groups pay approximately the same price for room air conditioners.

Home Heaters (Gas Vented)

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 14 percent for home heaters (gas vented) is the maximum improvement which is technologically and economically feasible. A summary of economic findings for home heaters (gas vented) follows:

Stage I. The total price increase resulting from implementation of the selected design options is $110 per unit, which yields a production-weighted price increase of $21 in current prices and $24.30 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for home heaters (gas vented). No scarce materials are significantly affected by the proposed target.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of $1.2 million, which amounts to about $197 thousand per firm in additional reseach and development along with capital costs. Investment requirement per firm is the cumulative cost for each design option based in part on the May–June 1976 testimony and comments. Alternative investment to produce an amount of energy equivalent to that which will be saved by the design options is $15 million.

The threat of shifts in industry market structure which might affect the existence of small firms does not appear to be a problem for home heating (gas vented) manufacturers, since a revenue base of about $2 million, or 1 percent of market share, is sufficient to finance investment requirements of the stated design options. Such a revenue base is typical of the small firms.

A disproportionate impact on income groups does not appear to exist, since available information suggests that all income groups pay approximately the same price for home heaters (gas vented).

Oil Vented Home Heaters

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 12 percent for oil vented home heaters is the maximum improvement which is technologically and economically feasible. A summary of economic findings for oil vented home heaters follows:

Stage I. The total price increase resulting from implementation of the selected design options is $31 in current prices, both per unit and on a production-weighted basis, and $35.93 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for oil vented home heaters.

No scarce materials are affected by the proposed target.

Profitability and growth of the manufacturers is adequate to finance investment of about $170 thousand per firm in additional research and development along with capital costs. The investment requirement per firm is the cumulative cost for each design option. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $1.9 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient oil vented home heaters, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 40 thousand oil vented home heaters complying with the proposed target initially costs households an additional $1.4 million but lowers life cycle operating costs by $4.8 million, yielding a net benefit of $3.4 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments of results in an annual energy savings of 1.3 million gallons of fuel oil, which is equivalent to 173 billion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 19 million gallons, or 2.6 trillion Btu's, over the 15-year life of an average oil vented home heater.

Stage IV. Negative impacts from implementation of the proposed oil vented home heater target are not of substantial consequence because the relatively small replacement demand shows signs of declining below current low levels during the next decade. Comprehensive data concerning demand, employment, and industry structure for oil vented home heaters are not presently available but the data which are available imply that the impacts are not of substantial consequence.

Monochrome Television

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 186 percent for monochrome televisions is the maximum improvement which is technologically and economically feasible. A summary of economic findings for monochrome televisions follows:

Stage I. Energy efficiency improvements have been incorporated into currently produced models with no significant increase in price, because the production of such large numbers of the more efficient products has created economies of scale.

Stage II. Both scarce material supplies and investment fund requirements needed to accomplish the implementation of the proposed target for monochrome television are negligible.

No scarce materials are affected by the proposed target.

Additional investment in research and development and plant and equipment is not necessary, as investment required to implement the design options has already been made by the manufacturers.

Stage III. All savings resulting from more energy-efficient monochrome televisions accure to the household sector, as there is no accompanying increase in purchase price.

The purchase and use of projected 1980 shipments of 3.5 million monochrome televisions complying with the proposed target initially costs households nothing, but lowers life cycle operating costs by $185 million, resulting in a net benefit of the same amount calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 576 million kWh's, which is equivalent to 6 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 6 billion kWh's, or 67 trillion Btu's over the 11-year life of an average monochrome television.

Statge IV. Negative impacts from implementation of the proposed monochrome television target are not of substantial consequence.

Demand would remain essentially unaffected due to the lack of change in the purchase price.

Employment is negligibly affected.

The threat of shifts in industry market structure to the detriment of small firms does not apply for television manufacturers, since the design options are already in effect.

The lowest income quartile will not be affected, as no price increase is involved for more efficient monochrome televisions.

Color Televisions

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 54 percent for color televisions is the maximum improvement which is technologically and economically feasible. A summary of economic findings for color television follows:

Stage I. Energy efficiency improvements have been incorporated into currently produced models with no significant increase in price, due to the enormous production of more efficient color televisions, resulting in economies of scale.

Stage II. Both scarce material supplies and investment funds needed to accomplish the implementation of the proposed target for color television are negligible.

No scarce materials are effected by the proposed target.

Additional investment in research and development and equipment is not necessary, as investment required to implement the design options has already been made by the manufacturers.

Stage III. All savings resulting from more energy-efficient color televisions accrue to the household sector, as there is no accompanying increase in purchase price.

The purchase and use of projected 1980 shipments of 10 million color televisions complying with the proposed target initially costs households nothing, but lowers life cycle operating costs by $518 million, resulting in a net benefit of the same amount calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 1.5 billion kWh's, which is equivalent to 16 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 18 billion kWh's, or 196 trillion Btu's, over the 12-year life of an average color television.

Stage IV. Negative impacts from implementation of the proposed color televisoin target are not of substantial consequence.

Demand would remain essentially unaffected, due to the lack of change in the purchase price.

Employment is negligibly affected.

The threat of shifts in industry market structure to the detriment of small firms does not apply for television manufacturers, since the design options are already in effect.

The lowest income quartile will not be affected, as no price increase is involved for more efficient color television.

Electric Kitchen Ranges and Ovens

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 3 percent for electric kitchen ranges and ovens is the maximum improvement which is technologically and economically feasible. A summary of economic findings for electric ranges follows:

Stage I. The total price increase resulting from implementation of the selected design options is $10 per unit, which yields a production-weighted price increase of $6 at current prices and $7 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for electric ranges.

The scarce material primarily affected by the proposed target is fiberglass, for which demand increases by 4,400 tons, or about 1 percent of the U.S. total. The industry can meet this demand shift without limiting domestic supplies or significantly increasing imports.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of about $0.6 million, which amounts to about $50 thousand per firm in additional research and development along with capital costs. Investment requirement per firm is the cumulative cost for each design option based in part on the May 1976 testimony and comments. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $1.9 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient electric ranges, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 4.4 million electric ranges complying with the proposed target initially costs households an additional $31 million in purchase price but lowers life cycle operating costs by $36 million, yielding a net benefit of $5 million calculated on present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 0.1 billion kWh's, which is equivalent to 1.1 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is almost 1.4 billion kWh's or 14.8 trillion Btu's over the 15-year life of an average electric range.

Stage IV. Negative impacts from implementation of the proposed electric range target are not of substantial consequence.

Demand in 1980 might reasonably decline by 0.5 percent, or about 22,000 electric ranges, because of the higher purchase price or more efficient products.

Employment might temporarily decline by .62 production workers, or less than 1 percent of electric range employment, in response to lower demand.

The threat of shifts in industry market structure which might affect the existence of small firms does not appear to be a problem for electric range manufacturers, since a revenue base of about $17 million, or 1 percent of market share, is sufficient to finance investment requirements for the stated design options. Such a revenue base is typical of the small firms.

The lowest income quartile may be negatively affected by paying a proportionately larger price increase for more efficient electric ranges, but available information suggests that this unfavorable bias is not of substantial consequence.

Gas Kitchen Ranges and Ovens

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 104 percent for gas kitchen ranges and ovens is the maximum improvement which is technologically and economically feasible. A summary of economic findings for gas ranges follows:

Stage I. The total price increase resulting from implementation of the selected design options is $35.00 in current prices, both per unit and on a production-weighted basis, and $40.60 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for gas ranges.

All scarce materials affected by the proposed target are related to the elimination of the standing pilot, so that added materials are negligible. The respective industries can meet demand shifts without limiting domestic supplies or significantly increasing imports.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of $1.3 million, which amounts to about $115 thousand per firm in additional research and development along with capital costs. Investment requirement per firm is the cumulative cost for each design option based in part on the May–June 1976 testimony and comments. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $67 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient gas ranges, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 2.4 million gas ranges complying with the proposed target initially costs households an additional $97 million but lowers life cycle operating costs by $247 million, yielding a net benefit of $150 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of

12 billion cubic feet of natural gas, which is equivalent to 14 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 181 billion cubic feet of natural gas, or 204 trillion Btu's, over the 15-year life of an average gas range.

Stage IV. Negative impacts from implementation of proposed gas range target are not of substantial consequence.

Demand in 1980 might reasonably increase by 8.4 percent, or 202,000 gas ranges, because of a higher rate of replacement of more efficient products.

Employment might temporarily increase by 473 production workers, or about 8 percent of gas range employment, in response to increased demand.

The threat of shifts in industry market structure which might affect the existence of small firms does not appear to be a problem for gas range manufacturers, since a revenue base of about $3 million, or 1 percent of market share, is sufficient to finance investment requirements of the stated design options. Such a revenue base is typical of the small firms.

The lowest income quartile may be negatively affected by paying a proportionately larger price increase for more efficient gas ranges, but available information suggests that this unfavorable bias is not of substantial consequence.

Microwave Ovens

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 5 percent for microwave ovens is the maximum improvement which is technologically and economically feasible. A summary of economic findings for microwave ovens follows:

Stage I. The total price increase resulting from implementation of the selected design options is $20.00 in current prices, both per unit and on a production-weighted basis, and $23.18 in 1980 prices.

Stage II. Both scarce material supplies and investment funds are sufficiently available to permit the implementation of the proposed target for microwave ovens.

No scarce materials are affected by the proposed target.

Profitability and growth of the major manufacturers is adequate to finance investment of 10 thousand per firm in additional research and development along with capital costs. The investment requirement per firm is the cumulative cost for each design option. Alternative investment required to produce an amount of energy equivalent to that which will be saved by the design options is $150 thousand.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient microwave ovens, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 1.0 million microwave ovens complying with the proposed target initially costs households an additional $1.5 million but lowers life cycle operating costs by $1.7 million, yielding a net benefit of $0.2 million calculated on a present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 4.5 million kWh's, which is equivalent to 0.5 billion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 68 million kWh's, or 7.5 billion Btu's, over the 15-year life of an average microwave oven.

Stage IV. Negative impacts from implementation of the proposed microwave ovens target are not of substantial consequence because of the relatively low level of projected demand in 1980 and corresponding slight degree of household penetration. Comprehensive data concerning demand, employment and industry structure for microwave ovens are not presently available, but the data which are available imply that the impacts are not of substantial consequence.

Clothes Washers

FEA, in a manner consistent with the methodology presented above, has determined that the proposed energy efficiency improvement target of 47 percent for clothes washers is the maximum improvement which is technologically and economically feasible. A summary of economic findings for clothes washers follows:

Stage I. The toal price increase resulting from implementation of the selected design options is $1.00 in current prices, both per unit and on a production-weighted basis, and $1.20 in 1980 prices.

Stage II. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient clothes washers, resulting in measurable energy savings.

No scarce materials are affected by the proposed target.

Profitability and growth of the major manufacturers is adequate to finance the total industry investment of almost $800 thousand, which amounts to about $120 thousand per firm in additional research and development along with capital costs. Investment requirements per firm is the cumulative cost for each design option based in part on the May–June 1976 testimony and comments. Alternative investment to produce an amount of energy equivalent to that which will be saved by the design options is $65.0 million.

Stage III. Benefits exceed costs for the household sector in the purchase and use of higher-priced, more efficient clothes washers, resulting in measurable energy savings.

The purchase and use of projected 1980 shipments of 6.1 million clothes washers complying with the proposed target initially costs households an additional $11 million but lowers life cycle operating costs by $704 million, yielding a net benefit of $693 million calculated on present value basis.

Achievement of proposed operating efficiency for projected 1980 shipments results in an annual energy savings of 4.0 billion kWh's, which is equivalent to 44 trillion Btu's of utility energy supply. Total energy savings of these 1980 shipments is 45 billion kWh's, or 303 trillion Btu's, over the 11 year life of an average clothes washer.

Stage IV. Negative impacts from implementation of proposed clothes washer targets are not of substantial consequence.

Demand in 1980 might reasonably increase by 6.3 percent, or 384,300 clothes washers, because of a higher rate of replacement of the more energy-efficient product.

Employment might temporarily increase by 760 production workers, or about 6 percent of the clothes washer industry employment, in response to higher demand.

The threat of shifts in industry market structure which might affect the existence of small firms apparently does not exist for clothes washer manufacturers, since 99 percent of the total market share is held by seven sizeable firms, with the remaining 1 percent of market share essentially held by either imports or subsidiaries of multiproduct corporations of considerable size.

The lowest income quartile may be negatively affected by paying a proportionately larger price increase for more efficient clothes washers, but available information suggests that this unfavorable bias is not of substantial consequence.

C. AGGREGATE ECONOMIC ANALYSIS

FEA, in a manner consistent with the economic methodology described previously in this notice, has determined that implementation of the proposed targets for the set of products specified in paragraph (1) through (10) of section 322(a) of the Act is economically feasible for manufacturers and consumers alike. FEA has also determined that the proposed targets for the individual product types yield the maximum technologically and economically feasible improvement for this set of products, and that these targets exceed the aggregate minimum improvement of 20 percent as required by the Act.

The results of the aggregate economic analysis are presented below.

Stage I. Integration of Energy Factors with Economic Impacts. In Table 24, the cost of improved energy efficiency for each product is cumulated. Both the energy savings and the purchase price increase for each product have been derived by cumulating particular design options for each product which were then production-weighted on the basis of those design options already in existence in 1972 shipments.

TABLE 24.—*Energy factors and cost of implementation*

Consumer product	Production-weighted			Projected costs in 1980		
	Energy savings (percent)	Purchase price increase		Number of shipments (millions)	Initial purchase cost (in millions of dollars)	Cost increase (in millions of dollars)
		Current	1980			
Refrigerators, refrigerator-freezers	32	$30.00	$45.20	7.1	3,703	321
Freezers	23	33.00	38.30	1.8	626	69
Room air-conditioner	23	47.00	54.50	6.0	1,739	327
TV—Color	35	0	0	10.0	5,560	0
TV—black and white	65	0	0	3.5	406	0
Room heater—gas	12	21.00	24.30	.7	203	17
Clothes washer	32	1.00	1.20	6.1	1,980	11
Dryer—electric	7	4.50	5.20	4.2	1,168	22
Dryer—gas	15	4.60	5.30	1.0	301	5
Dishwasher	20	21.00	24.00	4.9	1,420	117
Water heater—gas	20	17.00	19.70	3.1	503	61
Water heater—electric	15	16.00	18.50	4.1	570	76
Cooking range—gas	51	35.00	40.60	2.4	793	97
Cooking range—electric	3	6.00	7.00	4.4	1,708	31
Total				59.3	20,680	1,154

Proposed efficiency targets for 1980 shipments generate retail price increases for each product, which result from cost increases borne by manufacturers in implementing those design options mentioned above. The total 1980 price increase of $1,154 million is the combined result of achieving the specified energy targets for each type of product. The total price increase amounts to about a 6 percent increase over the initial purchase cost of $20,680 million, which is based on projected shipments of 59.3 million units in 1980. These projections underlie the aggregate economic feasibility analysis which follows.

Stage II—Availability of Economic Resources Material Requirements. Table 25 shows the total changes in demand for materials by all manufacturers when the various design options are incorporated into 1980 shipments. Each material is listed individually and the change in 1980 use is quantified in tons, based upon the forecast of 1980 shipments. The most notable changes occur with respect to urethane foam and fiberglass.

TABLE 25.—*Materials impact*

Materials	Change in tons (1980 shipments)	Change as a percent of U.S. total in 1974
1. Steel	+7,408	+0
2. Copper	+1,158	+.1
3. Fiberglass	−(30,330)	−(7.7)
4. Urethane foam	+49,130	+26.5
5. Plastics	+959	+.2
6. Aluminum	+9,000	+.2
7. Silicon carbide	+38	N/A
8. Capacitors	+9,309	(1)

[1] Capacitors material requirements vary and breakdown of material components is not available at this time.

Demand for urethane foam increases by about 50,000 tons in 1980, which is equivalent to almost one-third of total U.S. production in 1974 (latest data available). Demand for fiberglass declines by about 30,000 tons, which is equivalent to 8 percent of total U.S. production in 1974. The increased demand for urethane foam will probably lead to plants operating at full capacity, plant expansion and added employment of suppliers. The decline in the use of fiberglass will permit a greater use of this material in other energy-saving uses such as household insulation, but may also lead to some short-term dislocations in the industry, such as employee layoffs and plants operating at lower-than-usual capacity. Increases in other material requirements, including steel, copper, plastic, aluminum and silicon carbide, are negligible. These material changes will necessitate adjustments in raw material supplies which are achieveable for the various industries concerned. The increased use of capacitors cannot be stated in terms of exact quantities of specific materials required, but the effect is judged to be negligible. The total impact from shifts in material demand does not produce either a drain on scarce domestic material supplies or a significant increase in critical imports.

Investment Requirement

Additional requirements of capital investment, in research and development as well as in plant and equipment, have been determined by FEA and are based in part on industry testimony and comment in May and June 1976. Table 26 lists additional investment requirements which will be necessary to achieve the proposed targets. The required capital investment for the industry is the product of the number of firms manufacturing the consumer product, multiplied by the average investment of each firm to implement all relevant design options supporting the proposed target. Total additional capital investment by the corporations in an industry ranges, from a high of $10.4 million for dishwashers to a low of approximately $1.0 million per industry for most consumer products including cooking ranges, clothes washers, clothes dryers, electric water heaters, gas room heaters and televisions.

TABLE 26.—*Additional capital investment requirements by industry for each consumer product to achieve energy efficiency improvement targets* [1]

Consumer Product	Capital investment (in millions of dollars)	Capital investment per unit of energy saved (millions of kilowatt-hours
Dishwasher	10.4	0.6
Refrigerator/Refrigerator-Freezer	7.5	.1
Room air-conditioner	7.5	.3
Freezer	7.0	.8
Water heater—gas	2.1	.01
Water heater—electric	1.4	.03
Cooking range—gas	1.3	.02
Room heater—gas	1.2	.1
Clothes washer	.8	.02
Dryer—electric	.8	.2
Cooking range—electric	.6	.4
Dryer—gas	.5	.1
TV—color	0	0
TV—black and white	0	0
Total	41.1	.1

[1] FEA analysis and testimony at May 1976 hearings.

The corporations in the various manufacturing industries have sufficient financial resources to finance the required levels of investment. The structure, growth and profitability of the corporations in the various industries all combine to provide an adequate basis for undertaking the necessary research and development and plant and equipment acquisition which are reflected in the capital investment figures. Each industry is dominated by 8 to 12 firms, which control over 90 percent of market shares, forming an oligopoly. Although market shares have shifted during the past decade, resulting in some bankruptcies and corporate acquisitions, each industry has generally maintained a stable and profitable base. For example, three corporations average almost 60 percent of market share for eight consumer products. These three giant corporations exhibit a return on equity ranging from 8.2 to 17.9 percent, a return on total capital ranging from 6.6 to 14.5 percent, and annual sales growth ranging from 8.0 to 8.8 percent.[1] Smaller firms have either performed in comparable fashion or are subsidiaries of holding companies of comparable financial status.

Although the total additional capital investment requirement of $41.1 million is within the financial ability of the various industries, this level of investment does represent a one-third increase in new capital expenditures over the approximately $126 million invested in 1973 (latest available data). However, when total capital investment is contrasted with profit and overhead of $2,119 million in 1973, the proportion of total additional requirements for capital investment drops to only 2 percent of profit and overhead, even if the total

[1] Forbes Magazine, January 1977.

amount is required to be invested in 1980. Thus, even though production of efficient products necessitates a sizeable increase in new capital expenditures, total capital investment is a very small portion of profit-overhead expenditures for the various industries.

Not only are financial resources available within the related industries, but this investment represents a least cost alternative for the economy as a whole. The total additional capital investment ($41.1 million) required to achieve the proposed targets, thus reducing energy consumption, is less than the investment required to produce additional energy to run less efficient products. For example, investment required to produce an additional unit of energy in 1980 is projected at 2.5 mills/kWh compared to the 0.1 mill/kWh to save a unit of energy by investing in improvement of the energy efficiency of consumer products. The 0.1 mill/kWh is the cost resulting from the $41.1 million investment requirement divided by the 365,240 billion kWh's of reduced life cycle energy consumption resulting from implementation of the efficiency targets for 1980 shipments.

Stage III—Cost-Benefit Tradeoffs and Energy Consumption Household Sector Net Benefit. In the base forecast, households are projected to spend an estimated $20,680 million for these types of products in 1980. This rate of expenditure is equivalent to the sale of 59.3 million units purchased at an average price of $348.74. In shipping 59.3 million units in compliance with the proposed targets, manufacturers are projected to pass on implementation costs of $1,154 million in 1980.[3] Consequently, the average purchase price on all appliances increases by about $19.46 (from $348.74 to $368.20), a 6 percent rise in purchase price.

The increased purchase price is returned to households in slightly more than one year, due to lower operating costs of more energy-efficient consumer products. Projected annual operating costs for 59.3 million units operating at 1972 efficiency are $4,154 million. However, after implementing the proposed targets, annual operating costs are estimated to decline by $910 million, or 21.9 percent. This means that the increased purchase cost of $1,154 million is returned to households in about 15 months because of the lower annual operating costs. A payback period of 15 months is a strong incentive for consumers to respond positively to higher-priced, more efficient products meeting the proposed targets.

The present value of annual operating costs over the life of each consumer product is $28,201 million. Achievement of the proposed efficiency improvement targets reduces life cycle operating costs by $6,253 million to $21,948 million. The life cycle operating savings of $6,253 million minus the increased purchase cost of $1,154 million units shipped, bought and used in 1980, yields a net benefit to the household sector of $5,099 million.

Energy Consumption

The savings accruing to consumers in lower energy bills translates into reduced annual energy consumption of almost 30 trillion kWh's of equivalent energy. This savings of 30 trillion kWh's lowers the annual energy consumption of 1980 shipments (59.3 million units) from 116 trillion kWh's (operating at 1972 efficiencies) to 86 trillion kWh's. Thus, 1980 shipments which are in compliance with proposed targets yield end-use energy savings of almost 26 percent compared to shipments of 1972-level efficiency.

Annual energy savings of 30 trillion kWh's at household end use is equivalent to 221 trillion Btu's of energy savings at the utility fuel source.[4] Comparing greater efficiencies of 1980 shipments to 1972 shipments in terms of the utility fuel source results in savings of 25 percent. This is 1 percent lower than end use savings in kWh's because of the different weighting of natural gas compared to electricity in translating to Btu's at the utility site. Reduced energy consumption over product lives for 1980 shipments cumulates to 2,730 trillion Btu's or 2.7 quads. Energy savings of 221 trillion Btu's annually and 2,730 trillion But's cumulative are respectively equivalent to the energy content of 39 million barrels of crude oil annually or 483 million barrels cumulative.

Indirect energy consumption caused by both higher energy content of substituted materials and increased directly-purchased energy by manufacturers is negligible compared to the savings from operation of more efficient consumer products. The energy content of substituted materials increases energy consumption by 3 trillion Btu's, which amounts to one-tenth of 1 percent of cumulative energy savings. Directly purchased energy does not change as a result of consumer product improvements. The net effect of the two areas of indirect energy consumption leaves annual and cumulative savings practically unchanged.

Stage IV—Assessment of Negative Impact on Demand and Employment. Depending upon consumer response to higher-priced, more energy-efficient consumer products, a shift in demand could alter production and employment. The net effect on quantity demanded between higher purchase prices and lower operating costs is determined by the tradeoff between negative purchase price elasticity and positive operating cost elasticity.

This tradeoff could decrease demand by 1.2 million units, or 2.0 percent of projected 1980 shipments of 59.3 million units, as a result of the sudden price increase of 6 percent. If a one-to-one correlation exists between quantity demanded and employment, then the 2.0 percent decline in purchases of consumer products would lower production worker employment by approximately 2,800, or about 2.0 percent of total employment for manufacturers of the 10 consumer products and 0.01 percent of total manufacturing employment. Because of the negligible direct employment impact, indirect layoffs of supplying industries are also considered to be negligible.

Although this assessment reveals negligible negative impacts, it is possible that demand and employment will decline to a greater extent if consumers disregard operating savings in purchase decisions. In this case, purchase price elasticity would bear almost full negative impact on demand while the moderating positive effect of operating cost elasticity would be practically negated. Under such conditions, demand could decline by 7.3 percent, or 4.3 million units, causing production worker employment to decline by approximately 9,100, or 7.1 percent of consumer product employment and 0.04 percent of total manufacturing employment.

This analysis of possible shifts in demand and employment does not fully incorporate the effects of changes in household perceptions concerning purchase prices or operating costs. First, the elasticities for purchase price and operating costs are based on statistical analysis of time series which are heavily weighted by pre-1973 perceptions, prior to the energy crisis period. Second, these elasticities ignore the positive effect of a successful consumer education and labeling program, which should alter the relationship between the two elasticities even to the extent that positive operating cost elasticity may outweigh negative purchase price elasticity. On this basis, it has been determined that 1980 layoffs of production workers may approach the lower range of 2,800, but this impact is temporary and negligible.

Industry Structure

Possible shifts in industry structure as a result of implementing the proposed targets have been examined for biased impacts between large and small manufacturers of consumer products. Two aspects of industry structure describe the differences between small and large manufacturers: cost structure and market share. Cost structure is divided into material, payroll, and profit and overhead. Recent data from Census of Manufacturers reveal the following cost structure breakdown between these three parts: 56.1 percent material, 17.5 percent payroll and 26.4 percent for profit and overhead. The same source reveals that large and small manufacturers reflect an essentially similar cost structure with only minor variations. Hence, from a cost perspective, the implementation of various design options affects material, payroll, and profit and overhead in a proportionately similar

[3] For purposes of evaluating impact, shipments and purchases are assumed to occur in the same year, ignoring inventory lags; this does not change the substance of the analysis.

[4] Energy savings by individual consumer product developed from particular design options by National Bureau of Standards for FEA.

fashion, regardless of the manufacturing firm's size.

A possible difference in impact between large and small firms may occur in financing the necessary investment in plant and equipment. A small manufacturer that is not a subsidiary of a holding company is at a relative disadvantage in attempting to finance a large investment in plant and equipment from a relatively small revenue base. However, such heavy investment occurs primarily with respect to dishwashers, refrigerators, freezers and room air conditioners, and the market share of these consumer products is held primarily by firms with sufficient size to finance large investments. These four products are essentially supplied by 7 to 12 firms with the following market share: 99 percent for dishwashers, 97 percent for refrigerators, and 93 percent for both freezers and room air conditioners. Those firms which make up the remaining market share may endure adverse consequences, but the impact on increased concentration of industry structure would be negligible. The small firms, however, do have the opportunity to develop other innovative energy efficiency changes and to incorporate these improvements into their products. Hence, no significant shifts in industry structure are foreseen.

Income Group

Low income purchasers, who on the average buy lower-priced consumer products, may be unfavorably biased if the incorporation of efficiency improvements results in the manufacturer's assigning a uniform price increase in absolute dollars across the whole price range of various product lines. In such a case, although the absolute dollar increase is constant for low and high-priced product lines, the percent increase is greater for bottom-of-the-line products. A higher percent increase in lower-priced product lines means a greater negative impact on demand by these purchasers.

The 1973–74 Purchase and Ownership Survey of the Bureau of Census shows that for eight of the ten consumer products (excluding only room heaters and water heaters), the price paid by the lowest income quartile is 20 percent lower than the average price paid by the highest income quartile. Hence, the income quartile with the lowest discretionary income may be obliged to reduce its purchases to a greater extent than other income groups. Although the possibility of a greater negative effect on this lower income group is not quantifiable from available data, it is judged to be negligible at this time. If the manufacturers do not distribute the cost increases on a uniform basis and instead assign a greater burden of the increased costs to the higher-priced lines, then the negative impact on the lower income groups would be moderated.

IV. Request for Particular Comments

FEA is interested in receiving comments on all definitions previously promulgated or proposed in section 430.2 as these provisions might affect the efficiency improvement targets. Comments with respect to efficiency improvement targets regarding provisions in previously promulgated or proposed section 430.2 are timely until the close of the written record. It is expected that definitions for each of the product types will be finalized before the prescription of targets.

For the convenience of the reviewer, the proposed definitions directly related to efficiency improvement targets proposed today are as follows:

"Refrigerator" means a cabinet designed for the refrigerated storage of food at temperatures above 32° F, and having a source of refrigeration requiring an energy input. It may include a compartment for the freezing and storage of food at temperatures below 32° F but does not provide a separate low temperature compartment designed for the freezing of and the long-term storage of food at temperatures below 8° F. It has only one exterior door, but it may have interior doors on compartments (41 FR 19979, May 14, 1976).

"Refrigerator-freezer" means a cabinet which consists of two or more compartments with at least one of the compartments designed for the refrigerated storage of foods at temperatures above 32° F and with at least one of the compartments designed for the freezing of and the storage of frozen foods at temperatures of 8° F or below and may be capable of being adjusted by the user to a temperature of 0° F or below. The source of refrigeration requires energy input (41 FR 19979, May 14, 1976).

"Freezer" means a cabinet designed as a unit for the storage of food at temperatures of 0° F, having the ability to freeze food, and having a source of refrigeration requiring an energy input (41 FR 19979, May 14, 1976).

"Dishwasher" means a cabinet-like appliance which, with the aid of water and detergent, washes, rinses, and dries (when a drying process is included) dishware, glassware, eating utensils, and most cooking utensils by chemical, mechanical and/or electrical means and discharges to the plumbing drainage system (41 FR 19979, May 14, 1976).

"Electric clothes dryer" means a cabinet-like appliance designed to dry fabrics in a tumble-type drum with forced air circulation. The heat source is electricity and the drum and blowers are driven by an electric motor(s) (41 FR 19979, May 14, 1976).

"Gas clothes dryer" means a cabinet-like appliance designed to dry fabrics in a tumbel-type drum with forced air circulation. The heat source is gas and the drum and blowers are driven by an electric motor(s) (41 FR 19979, May 14, 1976).

"Water heater" means an automatically controlled thermally insulated vessel designed for heating water and storing of heated water, utilizing either oil, gas, or electricity as the energy source for heating water, and intended for residential use (42 FR 21579, April 27, 1977).

"Electric water heater" means a water heater that utilizes electricity as the energy source; that has a manufacturer's specified energy input rating of 12 kilowatts or less at a voltage no greater than 250 volts, a manufacturer's specified storage capacity of not less than 30 gallons nor more than 120 gallons; and that is designed to produce hot water at a temperature less than 180° F (42 FR 21578, April 27, 1977).

"Gas water heater" means a water heater that utilizes gas as the energy source; that has a manufacturer's specified energy input rating of 75,000 Btu per hour or less, a manufacturer's specified storage capacity of not less than 20 gallons nor more than 100 gallons; and that is designed to produce hot water at a temperature less than 180° F (42 FR 21578, April 27, 1977).

"Oil water heater" means a water heater that utilizes oil as the energy source; that has a manufacturer's specified energy input rating of 172,500 Btu per hour or less, a manufacturer's specified storage capacity of 50 gallons or less; and that is designed to produce hot water at a temperature less than 180° F (42 FR 21578, April 27, 1977).

"Room air conditioner" means an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. It includes a prime source of refrigeration and may include a means for ventilating and heating (Final definition: 42 FR 27898, June 1, 1977).

"Home heating equipment, not including furnaces" means vented home heating equipment and unvented home heating equipment (42 FR 23863, May 11, 1977).

"Unvented home heating equipment" means a class of home heating equipment not including furnaces, used for the purpose of furnishing heat to a space proximate to such heater directly from the heater and without duct connections and includes electric heaters and unvented gas heaters (42 FR 23863, May 11, 1977).

"Unvented gas heater" means an unvented, self-contained, free-standing, nonrecessed gas-burning appliance which furnishes warm air by gravity or fan circulation, and includes unvented circulators, radiant heaters, unvented overhead heaters, and wall heaters, unvented closed front (42 FR 23863, May 11, 1977).

"Unvented Circulator" means an unvented gas heater having an external jacket surrounding the burner and designed to convert the energy in gas to convected and radiant heat by direct mixing of air inside the jacket (42 FR 23863, May 11, 1977).

"Radiant heaters" means an open-front unvented gas heater designed primarily to convert the energy in gas to radiant heat by means of refractory radiants or similar radiating materials. A radiant heater has no external jacket and is only installed in an incombustible fireplace (42 FR 23863, May 11, 1977).

"Unvented overhead heater" means an unvented gas heater for suspension from the ceiling in the room being heated (42 FR 23863, May 11, 1977).

"Wall heater, unvented closed front" means an unvented circulator which has a closed front and is designed for insertion in or attachment to a wall or partition (42 FR 23863, May 11, 1977).

"Electric heater" means an electric appliance in which heat is generated from electrical energy and dissipated by convection and radiation and includes baseboard electric heaters, ceiling electric heaters, floor electric heaters, portable electric heaters, and wall electric heaters (42 FR 23863, May 11, 1977).

"Baseboard electric heater" means an electric heater which is intended to be recessed in or surface mounted on walls at floor level, which is characterized by long, low physical dimensions, and which transfers heat by natural convection and/or radiation (42 FR 23863, May 11, 1977).

"Ceiling electric heater" means an electric heater which is intended to be recessed in, surface mounted on, or hung from a ceiling, and which transfers heat by radiation and/or convection (either natural or forced) (42 FR 23863, May 11, 1977).

"Floor electric heater" means an electric heater which is intended to be recessed in a floor, and which transfers by radiation and/or convection (either natural or forced) (42 FR 23863, May 11, 1977).

"Portable electric heater" means an electric heater which is intended to stand unsupported, which is connected to an electric supply by means of a cord and plug, and which transfers heat by radiation and/or convection (either natural or forced) (42 FR 23863, May 11, 1977).

"Wall electric heater" means an electric heater (excluding baseboard electric heaters) which is intended to be recessed in or surface mounted on walls, which transfers heat by radiation and/or convection (either natural or forced) and which includes forced convectors, natural convectors, radiant heaters, high wall, or valance heaters (42 FR 23863, May 11, 1977).

"Vented gas and oil fired room heater" means a vented self-contained, freestanding, nonrecessed gas-burning or oil-burning appliance for furnishing warm air to the space in which installed, directly from the heater without duct connections and includes the following products:

(a) "Vented circulator" means a room heater designed to convert the energy in fuel gas to convected and radiant heat, by transfer of heat from flue gases to a heat exchanger surface, without mixing of flue gases with circulating heated air. Vented circulators may be equipped with transparent panels and radiating surfaces to increase radiant heat transfer as long as separation of flue gases from circulating air is maintained.

(b) "Fan type vented circulator" means a vented circulator equipped with an integral circulating air fan, the operation of which is necessary for satisfactory appliance performance.

(c) "Vented overhead heater" means a room heater designed for suspension from or attachment to or adjacent to the ceiling of the room being heated and transferring the energy of the flue gas to the space being heated primarily by radiation downward from a hot surface and in which there is no mixing of flue gases with the air of the space being heated (41 FR 19979, May 14, 1976).

"Vented" means having an opening, as in a wall, serving as an outlet for the products of combustion (41 FR 19979, May 14, 1976).

"Monochrome television receiver" means an apparatus designed to convert incoming broadcast signals into monochrome television pictures with the customarily associated sound. It is or can be powered by an alternating electric current and is produced primarily for residential use (41 FR 19979, May 14, 1976).

"Color television receiver" means an apparatus designed to convert incoming broadcast signals into color television pictures with the customarily associated sound. It is or can be powered by alternating electric current and is produced primarily for residential use (41 FR 19979, May 14, 1976).

"Kitchen ranges and ovens" means consumer products that are used as the principal household cooking appliances. They are designed to cook or heat different types of food by one or more of the following sources of heat: gas, electricity, or microwave energy. Each product may consist of a horizontal cooking top containing surface units and/or one or more heating compartments. They must be one of the following classes: conventional ranges, conventional cooking tops, conventional ovens, microwave ovens, and other kitchen ranges and ovens (42 FR 30632, June 16, 1977).

"Conventional range" means a household cooking appliance consisting of a conventional cooking top and one or more conventional ovens, in which both the cooking top and the oven (or ovens) utilize either gas burners or electric resistance heaters as the source of heat (42 FR 30632, June 16, 1977).

"Conventional cooking top" means a horizontal surface containing surface units heated by means of either gas burners or electric resistance heaters (42 FR 30632, June 16, 1977).

"Conventional oven" means a compartment or compartments intended for the cooking or heating of food by means of gas burners or electric resistance heaters. It may include a broiler (42 FR 30632, June 16, 1977).

"Microwave oven" means a compartment designed to heat food by means of microwave energy (42 FR 30632, June 16, 1977).

"Other kitchen ranges and ovens" means any class of kitchen ranges and ovens other than conventional ranges, conventional cooking tops, conventional ovens, and microwave ovens (42 FR 30632, June 16, 1977).

"Surface unit" means a unit mounted in a cooking top and designed for the heating or cooking of food (42 FR 30632, June 16, 1977).

"Clothes washer" means a consumer product designed to clean clothes, utilizing a water solution of soap and/or detergent and mechanical agitation or other movement, and must be one of the following classes: automatic clothes washers, semi-automatic clothes washers, and other clothes washers (42 FR 25333, May 17, 1977).

"Automatic clothes washer" means a regular, standard or compact clothes washer which has a control system which is capable of scheduling a preselected combination of operations, such as regulation of water temperature, regulation of the water fill level, and performance of wash, rinse, drain and spin functions, without the need for user intervention subsequent to the initiation of machine operation (42 FR 25333, May 17, 1977).

"Semiautomatic clothes washer" means a regular, standard, or compact clothes washer which is the same as an automatic clothes washer except that user intervention is required to regulate the water temperature by means of external water faucet valves (42 FR 25333, May 17, 1977).

"Other clothes washer" means a regular, standard or compact clothes washer that is not an automatic or semiautomatic clothes washer (42 FR 25333, May 17, 1977).

V. Comment Procedures

A. Written Comment

Interested persons are invited to participate in this rulemaking by submitting data, views, or arguments with respect to the proposed energy efficiency improvement targets set forth in this notice to Executive Communications, Room 3317, Federal Energy Administration, Box NU, Washington, D.C. 20461.

Comments should be identified on the outside of the envelope and on the documents submitted to FEA Executive Communications with the designation "Proposed Efficiency Improvement Targets" and should also designate the appliance type to which the comments apply. Fifteen copies should be submitted. All comments received by August 22, 1977, before 4:30 p.m., e.d.t., and all other relevant information will be considered by FEA before final action is taken on the proposed regulations.

Any information or data considered by the person furnishing it to be confidential must be so identified and submitted in writing, one copy only. FEA reserves the right to determine the confidential status of the information or data and to treat it according to its determination.

B. Public Hearing

1. *Request Procedures.* Public hearings in this proceeding will be held beginning at 9:30 a.m. on August 16, 1977, in Room 3000A, Federal Building, 12th and Pennsylvania Avenue, NW., Washington, D.C. 20461 in order to receive comments from interested persons on the matters set forth herein. The schedule for such hearings is as follows:

Clothes washers: August 16, 1977, at 9:30 a.m.
Clothes dryers: August 16, 1977, at 1:30 p.m.
Dishwashers: August 17, 1977, at 9:30 a.m.
Water heaters: August 17, 1977, at 1:30 p.m.
Refrigerators, refrigerator-freezers, and freezers: August 18, 1977, at 9:30 a.m.

Kitchen ranges and ovens: August 18, 1977, at 1:30 p.m.
Room air conditioners: August 19, 1977, at 9:30 a.m.
Home heating equipment, not including furnaces, and television sets: August 19, 1977, at 1:30 p.m.

Any person who has an interest in the proposed rulemaking issued today, or who is a representative of a group or class of persons that has an interest in today's proposed rulemaking, may request in writing an opportunity to make an oral presentation. Such a request should be directed to the address indicated at the beginning of this preamble, and must be received before 4:30 p.m. e.d.t., on August 10, 1977. Such a request may be hand-delivered to such address, between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday. A request should be labeled on the document and on the envelope "Proposed Efficiency Improvement Targets" and should state for which hearing or hearings the request is made.

The person making the request should briefly describe the interest concerned; if appropriate, state why she or he is a proper representative of a group or class of persons that has such an interest; and give a concise summary of the proposed oral presentation and a telephone number where he or she may be contacted through August 15, 1977. Each person selected to be heard will be so notified by FEA before 4:30 p.m., August 12, 1977 and must submit 50 copies of his or her statement to the address and by the date given in the beginning of this preamble. In the event any person wishing to testify cannot meet the 50 copy requirement, alternative arrangements can be made with the Office of Regulations Management in advance of the hearing by so indicating in the letter requesting an oral presentation or by calling the Office of Regulations Management at 202–254–3345.

2. *Conduct of hearings.* FEA reserves the right to select the persons to be heard at these hearings, to schedule their respective presentations and to establish the procedures governing the conduct of the hearings. The length of each presentation may be limited, based on the number of persons requesting to be heard.

An FEA official will be designated to preside at the hearings. These will not be judicial or evidentiary-type hearings. Execpt as provided below, questions may be asked only by those conducting the hearings, and there will be no cross-examination of persons presenting statements. Any decision made by FEA with respect to the subject matter of the hearings will be based on all information available to FEA. At the conclusion of all intial oral statements, each person who has made an oral statement will be given the opportunity, if he or she so desires, to make a rebuttal statement. The rebuttal statements will be given in the order in which the initial statements were made and will be subject to time limitations.

Any interested persons may submit questions to be asked of any person making a statement at the hearings, to Executive Communications, Box NU, FEA, before 4:30 p.m., e.d.t., August 16, 1977. FEA will determine whether the question is relevant, and whether the time limitations permit it to be persented for answer.

Further questioning will be permitted by FEA pursuant to section 336(a)(1)(B) of the Act. Any interested person will have the opportunity to question (1) other interested persons who have made oral presentations, and (2) employees of the United States who have made written or oral presentations, with respect to disputed issues of material fact. Such an opportunity will be afforded to the extent FEA determines that questioning pursuant to such procedures is likely to result in a more timely and effective resolution of the issues of material fact. Such opportunity with regard to oral presentations of interested persons and employees of the United States, will be provided at the public hearing. If this opportunity alone is insufficient or inconvenient for any interested person and/or employee, FEA will consider affording an additional opportunity for questioning at a convenient time. An opportunity to question employees of the United States who have made written presentations may be availed of by submission of written questions which must be received by Executive Communications, Box NU, FEA, by August 29, 1977. Questions must pertain to disputed issues of material fact regarding the target which is the subject of the hearing.

Any further procedural rules needed for the proper conduct of the hearings will be announced by the presiding officer. A transcript of the hearings will be made and the entire record of the hearings, including the transcript, will be retained by FEA and made available for inspection at the FEA Freedom of Information Office, Room 2107, Federal Building, 12th and Pennsylvania Avenue NW., Washington, D.C., between the hours of 8:00 a.m. to 4:30 p.m., Monday through Friday. Any person may purchase a copy of the transcript from the reporter. Technical and economic papers related to today's proposal will also be available for inspection by interested persons at the FEA Freedom of Information Office.

In addition to the information available at the Freedom of Information Office, FEA will make available background materials concerning the assumptions and data which were used in the analysis of economic feasibility. These background materials are classified by product and by fuel type, and are available to any person who submits a written request to James A. Smith, Room 307, Old Post Office Building, Federal Energy Administration, 12th and Pennsylvania Avenue, NW., Washington, D.C. 20461.

FEA will hold an economic briefing for interested persons for the purpose of describing the data, assumptions, and methodology which provide the basis for the economic feasibility analysis if sufficient interest in such a briefing is indicated to FEA. The purpose of this briefing would be to convey a better understanding of the basic economic factors which support the determination of economically feasible targets for these ten types of consumer products. The briefing would not be an opportunity for interested persons to submit comments concerning either the methodology or the conclusions, but it would allow the public an opportunity to ask relevant questions. Any person who believes that such a briefing would be useful should indicate in writing his or her interest within 10 days of the publication of this notice to James A. Smith, Room 307, Old Post Office Building, Federal Energy Administration, 12th and Pennsylvania Avenue NW., Washington, D.C. 20461.

VI. Environmental and Inflationary Review

As required in section 7(c)(2) of the Federal Energy Administration Act of 1974 (Pub. L. 93–275), a copy of this notice has been submitted to the Administrator of the Environmental Protection Agency for his comments concerning the impact of this proposal on the quality of the environment. The Administrator has no comments.

The National Environmental Policy Act of 1969 requires that FEA review Agency proposals to determine whether they constitute "major Federal actions significantly affecting the quality of the human environment" within the meaning of section 102(2)(c) of that Act. Since the targets proposed today are voluntary, compliance with these targets is a voluntary private action. This type of compliance is not a "Federal action" within the meaning of the statutory language. Since any compliance with the targets is entirely at the initiative of affected manufacturers and not FEA, it is virtually impossible for FEA to undertake meaningful analysis of the nature or scope of any environmental effects which might indirectly flow from the targets. Moreover, the goal of these targets is to induce reductions in energy consumption, as well as the environmental residuals of energy consumption and, thus, to improve environmental quality. On this basis, FEA has determined that, with respect to prescribing efficiency improvement targets under the conservation program for appliances, no environmental impact statement is required.

The proposal has been reviewed in accordance with Executive Order 11821 as amended by Executive Order 11949, and OMB Circular No. A–107 and has been determined to be a major proposal, but only on the assumption that the appliance manufacturers will in fact implement the measures which the economic feasibility analysis has found to be reasonable and achievable and that, therefore, they will fully comply with the targets. The targets, however, are voluntary in nature and since FEA cannot predict the actual degree of compliance it cannot, accordingly, predict the targets' actual economic impact. An economic

impact evaluation, based upon the assumptions contained in the economic feasibility analysis rather than on actual economic impact, has been completed and is available for public review.

(Energy Policy and Conservation Act, Pub. L. 94–163, amended by Pub. L. 94–385; Federal Energy Administration Act of 1974, Pub. L. 93–275, as amended by Pub. L. 94–385; E. O. 11790, 39 F.R. 23185.)

In consideration of the foregoing, proposed Subpart C of Part 430, Chapter II, Title 10, Code of Federal Regulations, published in 41 FR 19981, May 14, 1976, is hereby withdrawn and it is proposed to amend Chapter II, Title 10, Code of Federal Regulations, as set forth below.

Issued in Washington, D.C., July 8, 1977.

ERIC J. FYGI,
Acting General Counsel,
Federal Energy Administration.

1. Part 430 is amended by adding a Subpart C, to read as follows:

Subpart C—Energy Efficiency Improvement Targets

§ 430.31 Purpose and scope.

This subpart contains energy efficiency improvement targets required to be prescribed by FEA pursuant to section 325 (a) of the Act.

§ 430.32 Energy efficiency improvement targets.

(a) The energy efficiency improvement target for refrigerators and refrigerator-freezers shall be a 47 percent increase in energy efficiency for the total number of refrigerators and refrigerator-freezers manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of refrigerators and refrigerator-freezers manufactured by all manufacturers in calendar year 1972.

(b) The energy efficiency improvement target for freezers shall be a 30 percent increase in the energy efficiency for the total number of freezers manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of freezers manufactured by all manufacturers in calendar year 1972.

(c) The energy efficiency improvement target for dishwashers shall be a 25 percent increase in the energy efficiency for the total number of dishwashers manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of dishwashers manufactured by all manufacturers in calendar year 1972.

(d) The energy efficiency improvement target for clothes dryers shall be an 11 percent increase in energy efficiency for the total number of clothes dryers manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of clothes dryers manufactured by all manufacturers in calendar year 1972.

(e) The energy efficiency improvement target for water heaters shall be a 23 percent increase in energy efficiency for the total number of water heaters manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of water heaters manufactured by all manufacturers in calendar year 1972.

(f) The energy efficiency improvement target for room air-conditioners shall be a 30 percent increase in energy efficiency for the total number of room air-conditioners manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of room air-conditioners manufactured by all manufacturers in calendar year 1972.

(g) The energy efficiency improvement target for vented home heating equipment shall be a 13 percent increase in energy efficiency for the total amount of vented home heating equipment manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total amount of vented home heating equipment manufactured by all manufacturers in calendar year 1972.

(h) The energy efficiency improvement target for television sets shall be a 79 percent increase in energy efficiency for the total number of television sets manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of television sets manufactured by all manufacturers in calendar year 1972.

(i) The energy efficiency improvement target for kitchen ranges and ovens shall be a 64 percent increase in energy efficiency for the total number of kitchen ranges and ovens manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of kitchen ranges and ovens manufactured by all manufacturers in calendar year 1972.

(j) The energy efficiency improvement target for clothes washers shall be a 47 percent increase in energy efficiency for the total number of clothes washers manufactured by all manufacturers in calendar year 1980 when compared with the energy efficiency of the total number of clothes washers manufactured by all manufacturers in calendar year 1972.

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